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AMERICAN JOURNAL OF OPHTHALMOLOGY

Volume 13 May, 1930 Number 5

A NEW ("EYE AND HAND") METHOD OF TRAINING SQUINTS

ERNEST E. MADDOX, M.D., F.R.C.S.E.

BOURNEMOUTH, ENGLAND

The apparatus described is designed to employ the hand of the squinter to educate his squinting eye, imitating the natural process of infancy in which the hand and eye mutually perfect their training by trial and error. In the cheiroscope the picture carrier of the stereoscope is replaced by a horizontal surface upon which the child can draw and play, using the hand to demonstrate or develop the act of fusion of the image or object controlled by the amblyopic eye with the image or object seen independently by the more normally seeing eye. A mirror system is used to obtain the approximate adjustment necessary in the case of convergent squint. This paper has been revised and somewhat expanded from one read before the Royal Society of Medicine, Section of Ophthalmology, November, 1929; and it is here published by permission of that society.

Squint training is subject to extreme opinions, some claiming almost invariable success, others doubting the possibility of any. The truth lies between the two. It is of great value in suitable cases when made sufficiently intensive and prolonged.

Before introducing any new instrument, I think it due to pay a tribute to Mr. Worth for his amblyoscope, which has for so many years been "facile princeps" among squint training apparatus, and which will continue its useful work. Its ingeniously mounted "daughters", Howard's synoptiscope and Elliot's synoptophore, are also extremely useful.

The complementary instrument I wish to contribute, called the cheiroscope, approaches the problem from a different angle, on the simple principle of pressing the hand into service to educate the eye.

In infancy the hand and eye mutually perfect their training by trial and error. The name of the cheiroscope (from "χείρ", the hand, and "σκοπέω", I look) indicates that its object is to rehearse this early process when a squinting eye needs retraining. That the educational understanding between the two organs does not cease in later life is well illustrated by Colonel A. E. J. Lister's published case of a girl, aged eight years, blind from birth. After extraction of the cataract, Colonel Lister observed: "It was very interesting to watch the child learning to see, as at first she had to feel an object in order to identify it, and then she learned to recognize it by seeing it". (Transactions Ophthalmological Society of the United Kingdom, 1928, volume 48, p. 96.) The utility of the hand in helping the eye could scarcely have a better illustration.

Moreover, there is reason to believe that there is more understanding between an eye and the hand of the same side than with the hand of the opposite side. Sportsmen are fond of testing for their "master eye", and they do so with their right forefinger held up in apparent alignment with a distant object. Thus tested, they generally find the right eye dominant. Were they, however, to hold up the left forefinger, they would often find the left eye dominant, having more affinity with the left hand. The best plan is to unite the two forefingers in the median plane and raise them together.

When a horse or cow kicks out with one leg, the eye of the same side directs its aim. The developing eyes of the human embryo are also situated on each side of the head, only coming gradually forward to create the cyclopean eye. The final stage of development may be arrested before finality is reached, leaving the two halves of the binocular apparatus imperfectly bound together, and so an easy prey to any influence,

such as hypermetropia, congenital amblyopia, or nebulæ, which predisposes to squint.

Indeed, I suspect that many of the more incurable cases of squint are due

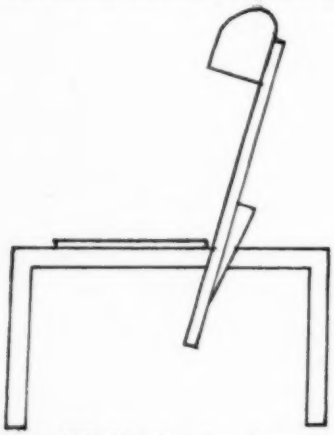

Fig. 1 (Maddox). An elementary cheiroscope.

to persistence of infantilism in the oculomotor apparatus, each eye retaining its individuality too much and being easily induced to do business on its own account instead of in partnership. When the eyes of infants appear straight, or even are straight, it does not follow that there is true fusion; each eye may simply be held straight by its own fixation reflex independently of the other. When the individualness is complete, we have what Mr. Worth calls "intrinsic alternating squint", in which the eyes alternately suppress each other from birth.

May we not gather from all this that an amblyopic eye is better trained by the hand of the same side, though in the case of the left hand it may be more difficult to do so?

To return to the cheiroscope, it is nothing more than a stereoscope which, instead of holding a picture carrier, is supported by such a carrier, the latter being a flat horizontal surface on which a child can draw and play. An elementary cheiroscope can be made by removing the handle and cross-bar from an ordinary Holmes stereoscope and thrusting the longitudinal strip through a rectangular slot cut out a little obliquely through a table, or through the bottom of an inverted box (figure 1). An ordinary window-wedge, made to be co-tenant of the slot, fixes the focal length of the instrument as required. The flat surface of the table can now be used to lay the two halves of stereograms upon; or a picture may be laid or drawn before one eye that the other eye may help to trace its image, or little solid animals, beads, rings, etc. may be played with, both eyes being keenly at work, and more so because the child's fingers are engaged with the objects. A modification of the prismo-spheres to enable them to approach or recede from each other is a great advantage, as also is a handle to each lens enabling it to be rotated in its cell, or wobbled so as to make the image belonging to the amblyopic eye appear to oscillate and thus attract more attention. Both of these improvements are shown in the skeleton diagram (figure 2). The duck and pencil appear to the child to coincide, and the pencil can trace the duck on the drawing surface. Unfortunately, this simple form of cheiroscope shown at Oxford in July, 1928, is only available for divergent squint, or for eyes put straight by operation.

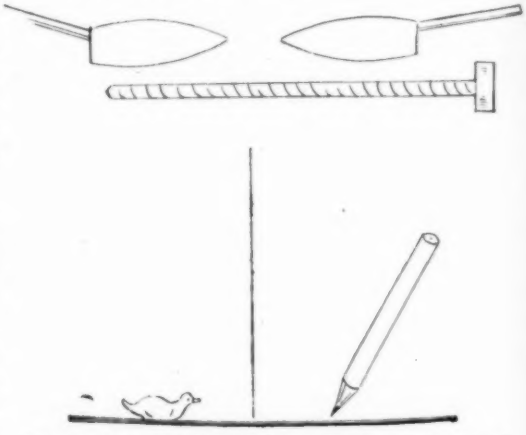

Fig. 2 (Maddox). The eye-wakener form of cheiroscope.

For convergent squint, a more universal instrument is necessary, provided with a mirror, as in figure 3. A double mirror is convenient, to save turning the instrument round, and my instrument makers have swung it from

the roof for me quite cleverly, and have suggested fitting the drawing surface with a bundle of papers such as school children now use, to save the use of a sponge. These papers are capable of being withdrawn one by one when drawn upon, so as to save the trouble of cleaning an opal plate with a sponge. The pictures drawn by the children can thus be preserved for reference so as to note their progressive improvement. An opal plate can be substituted whenever wished, or a sheet of black metal, which forms an interesting background for some images.

There are four ways of using it, which we may describe as those of (1) the "covered mirror", (2) the "absent mirror", (3) the "oblique mirror", and (4) the "vertical mirror". In the first, the mirror hangs perpendicularly and is de-mirrorized by slipping over it a metal cover which is white or black to match the color of the drawing surface (figure 4). Then a picture, laid on one side of the partition thus formed, may have its displaced image drawn, or traced over, on the other side. One eye

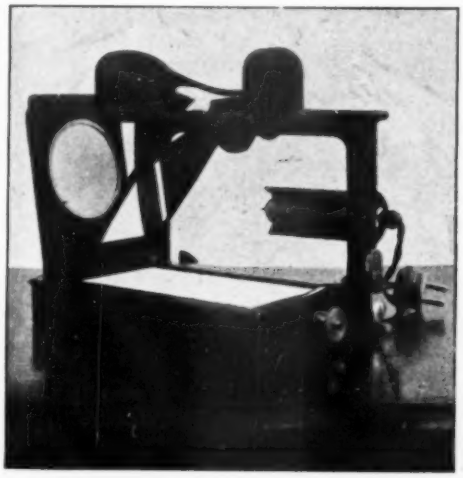

Fig. 3 (Maddox). The complete cheiroscope.

sees the picture, the other the pencil that draws it. (Compare figure 2.)

I lay great stress on drawing, however elementary the skeleton diagrams may be. Children soon tire of merely looking at the same pictures over and over again, for the wandering mind characteristic of childhood is generally accentuated in squinters. But give a child something to draw or do with his hand, and then see with what intensity

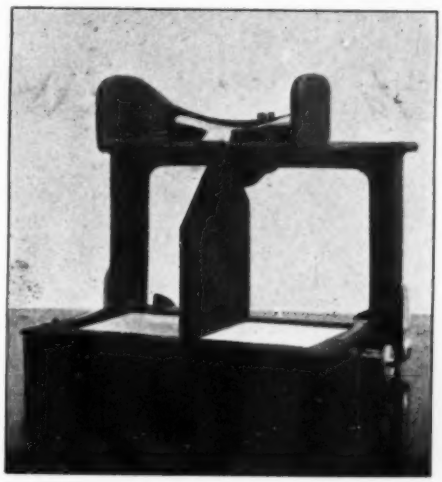

Fig. 4 (Maddox). The "covered mirror" method.

he bends to his task, quite forgetful of his environment, especially if the task is an ever-fresh one. The eye belonging to the hand is tempted to the spot with which the hand is occupied and does its best to help it, even though it only wakes up to do so gradually, while, at the same time, the surgeon learns what the child's brain is doing by watching the hand. It is this kind of intensive effort that the cheiroscope seeks to cultivate, for without mental concentration little is effected.

What happens is this. The relaxation of accommodation by the lenses causes crossed diplopia of the two halves of the drawing surface, so that they move together, bringing objects laid upon them into proximity or fusion, as required. Thus, a bead beneath one eye can have a ring, seen by the other eye, placed apparently round it by the child, as in figure 5. Small toy animals, each seen by a different eye, can be made to kiss each other, or, if similar, be blended into one, or the child can place a ring round one, or feed it, or even draw it. Worth's diagrams make quite good pictures for drawing, the child

tracing over what is really the image of the picture.

In the cheiroscope we make great use of the attention-arresting effect of mo-

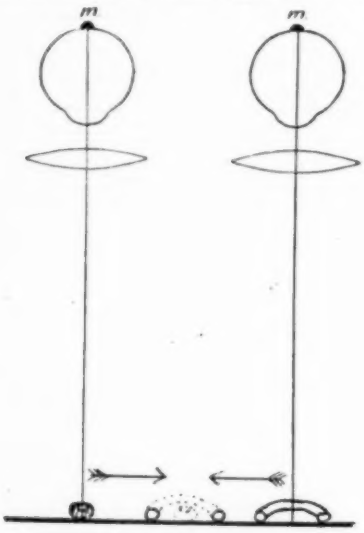

Fig. 5 (Maddox). Bringing a bead into the apparent center of a ring.

tion. The principle is well understood by animals; for instance, birds know that if they lie still they are not likely to be seen by the hawk. Indeed, the microscopic wanderings of the fovea even in normal fixation suggest that motion is necessary for all ordinary visual acts, other than instantaneous. With the cheiroscope, one or both objects can be kept in movement, as when a fly, butterfly, or mouse is moved about on one half of the drawing surface by the teacher, while the child moves a spider, butterfly net, or cat on the other half to try and catch it. The surgeon can move his finger on one side while the child attempts to place its own finger on the moving image, which appears beneath the other eye. In the earlier form of cheiroscope, called the "eye-wakener", which I showed at Oxford in 1928, but which, having no mirror, is not available for convergent squint, the prisms are adjustable and rotatable, so as to make the images appear to wobble, a principle worth adopting in this instrument.

It is a great advantage not to be limited to one set of pictures. The pictures may be cut out of the numerous children's books and periodicals, Christmas cards, cigarette cards, and so on, and can be collected by the children themselves in great variety. All kinds of exercises, beside drawing, will occur to a resourceful teacher, sympathetic with the child mind and yet able to control it. Thus, the picture of a pretty little girl on one side can have a bead necklace painstakingly constructed round its neck by the child, bead by bead, held in forceps, one eye all the time seeing the little girl, and the other the beads. A fierce open-mouthed lion on one side can be fed by red beads on the other, first placed in its mouth, and then gently wheedled, by a paint-brush, down its esophagus into its paunch; when this is well filled by a number of different beads, it may be assumed that he is well fed. Green beads can be used for feeding a cow, and be brought up again for chewing the cud. The possible exercises are limited only by the teacher's ingenuity, while continual variation sustains the child's interest.

For the second (absent mirror) method, we remove the mirror com-

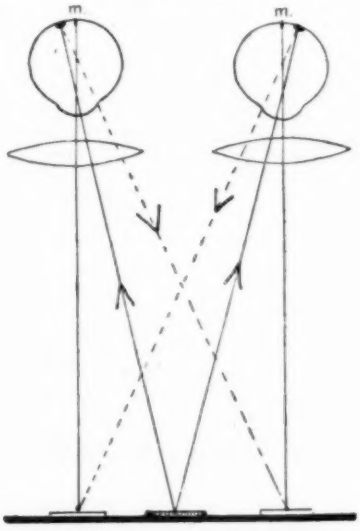

Fig. 6 (Maddox). Test for master eye.

pletely and scatter a number of beads and rings over the whole of the drawing surface. The child, provided with a pair of forceps, is told to pick up the beads and put them in the rings. Some

it can pick up quite easily, while others are "fairy beads," being images only, and thus resist all its efforts. A coin placed in the center (figure 6) will appear double, and if the child be told to insert another object between the two images it will place it to one side or other of the coin, according to whichever eye is the master eye at the time.

To cultivate fusion, later on, we revert again to the covered mirror, when two similar beads or brass rings make a good start, one on each side of the covered mirror, and they can be drawn slowly apart by means of the paper they are on. Dominoes make excellent objects for this purpose, because, as the dots are different on the two images, we can tell whether there is fusion or not by the combined number of dots seen on the single image. Again, ordinary stereograms, as made for stereoscopes, can be cut in halves, one-half being laid on one side, motionless, while the child adjusts the other half to agree with it.

While, however, the first two methods are excellent for eyes that are nearly straight, they are not available for pronounced squints, because with them the visual lines meet the floor

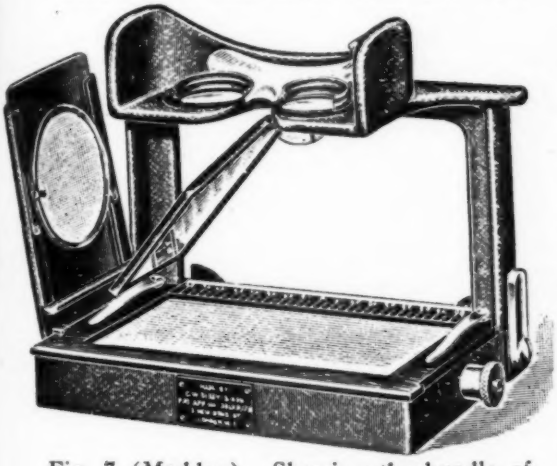

Fig. 7 (Maddox). Showing the bundle of papers on the floor.

of the instrument too close together and leave little room for any play with moving objects. Here, the third or "oblique mirror" method comes to the rescue (figure 7). A slanting mirror is placed beneath one eye so as to leave the other eye free to roam over the whole floor of the instrument, thus resembling a one-sided Wheatstone

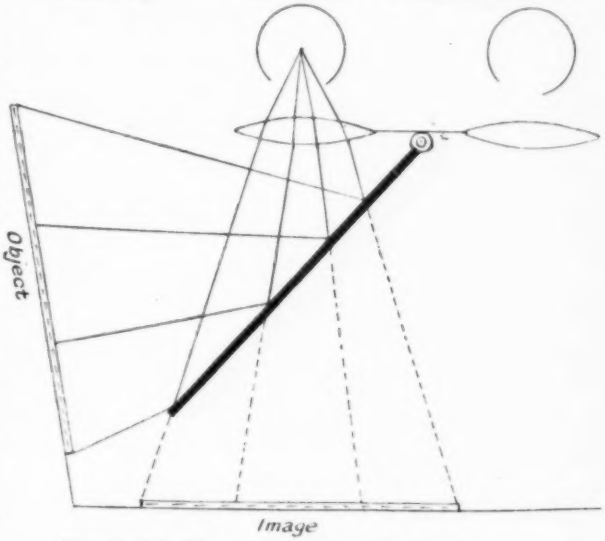

Fig. 8 (Maddox). Showing the image formed by the cheiroscope mirror.

stereoscope, the other side of which, however, is replaced by a drawing surface. The mirror can be set at any angle. The most useful is probably forty degrees from the vertical, where it is held by a catch (figure 8). This requires a picture carrier sloped ten degrees from the vertical. The exact slope of the picture carrier is calculated to allow the image of the picture to fall horizontally on the floor of the instrument. Any other angle would make it slant. For example, with a mirror twenty degrees from the vertical, a picture must have a slope of forty degrees from the horizontal, as illustrated in figure 9. The rule at which I have arrived is that the angle of the picture from the horizontal must be double that of the mirror from the vertical.

Owing to the lateral inversion caused by a mirror, only symmetrical pictures, such as front faces of men or animals, boxes, vases, bird-cages, etc., are suitable for fusion exercises with the oblique mirror. For drawing purposes this limitation does not exist, since it is then immaterial whether a face or animal looks east or west. A second mir-

ror, as in figure 10, but with a screen added to intercept direct vision of the object, would meet the fusion difficulty,

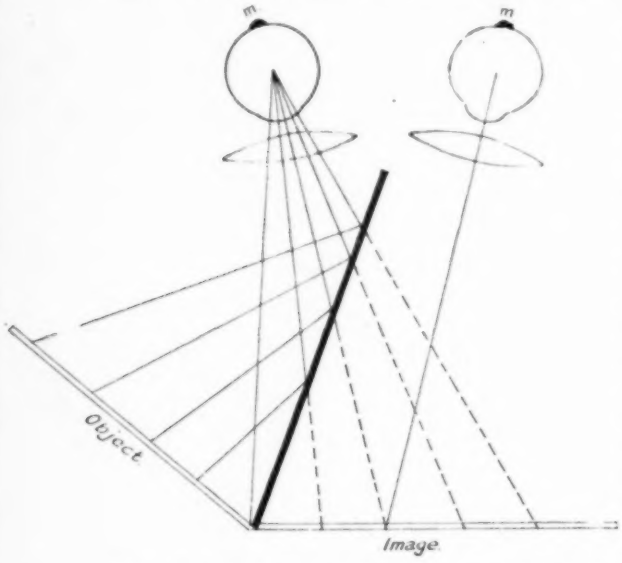

Fig. 9 (Maddox). The mirror set at 20° from the vertical.

but I have not thought it worth while so far.

A rotating wheel on the picture carrier has been devised; on this one animal may appear to chase another, as for example a spider after a fly. I call it the "Winter wheel" from the mechanic who suggested it.

The fourth method is that of the "vertical naked mirror", which is suitable for convergent squints of very high degree. For extreme cases, both surfaces of the mirror can be used, and, since each mirror causes lateral inversion, the images are congruous and can be fused. For lesser squints, a single surface is more convenient, and in either case the vertical mirror method has the great advantage of a flat surface on each side for beads, small toy animals, or other solid objects which the picture carrier cannot support. Metal mirrors, though expensive, are much the best.

The two essentials for squint training are perseverance and concentration. It makes a difference whether we knock at a front door softly or loudly, and sometimes we have to knock repeatedly before it opens. It is so with the brain. Exercises may seem to have no effect for some time, and then suddenly succeed, the effect being cumulative, each one, though apparently disappointing, contributing to the final end.

A story is told in print (I cannot vouch for its accuracy but it well illustrates my present point) of a gentleman who watched a mason patiently hitting a large stone with a small hammer on exactly the same spot. Nothing happened till at last it split in two. "Now which of those knocks", asked the mason, "did the trick?" "The last", said the onlooker. "No", said the mason, "each knock did as much as the other". Similarly, to force a passage through synapses is like boring a tunnel through a mountain. All is darkness, in spite of the progress made, till suddenly the light bursts in at the other end. The moral is that just when you are most inclined to give up you may be nearest the end. Only take care you are not educating a "false macula", as it is called. Calculate where the object should be placed to occupy the true fixation position.

Since the motor center of the eyeball is about 15 cm. from the drawing surface, each centrad of squint answers to about 1.5 mm. on the latter. Know-

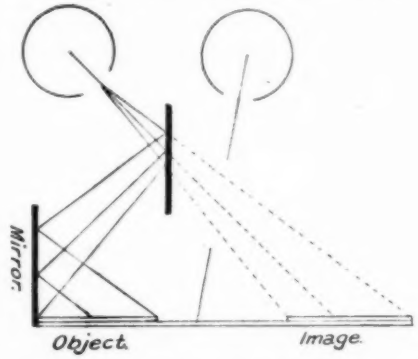

Fig. 10 (Maddox). The double-mirror cheiroscope (screen not shown).

ing the distance apart of the centers of motion of the eyes, and the amount of squint, we can compound these sufficiently well to surmise pretty nearly where the two fixation lines should strike the floor of the instrument.

Even should the exercises not succeed in conquering the amblyopia, it is not all labor lost, for they seem to have the same effect on the visual part of the brain as "Pelmanism" has on the mental, and it is the commonest thing for parents or teachers to remark spontaneously on the improvement in a child's alertness.

The following are a few of the countless expedients possible:

Butterfly device. Take a long hatpin, and, after removing the head and point, fix a paper butterfly on one end and wrap a thin roll of plaster round the other end. Remove the picture carrier, after noticing the plane it occupies in space, keep the butterfly in that plane in rapid rotation of the pin. This will make it appear to fly. The child at the same time, by means of a butterfly net laid on the floor of the instrument before the other eye, tries to catch the butterfly as it is made to fly about the picture plane, and when he thinks he has succeeded and exclaims so, the motion is stopped and the butterfly appears dead in the net. In a second or two, however, it recovers and flies away, to be again caught. This keeps both eyes pretty much alive.

Distant vision device. Place a —7. D. or —8. D. lens in the cell provided above the mirror, and remove the picture carrier, setting the mirror at the usual forty degrees. Then the parent can stand at some little distance, holding toys of various kinds. Or if a —8. D. lens be used an outdoor scene through the window can be brought upon the floor of the instrument, the mirror being adjusted to any necessary angle, and the child made to point with its finger to the various items it is able to detect.

Translucent device. If the picture carrier be replaced by a translucent plate, any device written or drawn on the outside of the sheet appears to the child congruous with a similar device seen by the other eye, the reversal of the mirror being thus overcome. Translucencies may also be employed, such as ordinary lantern slides, obtainable in so large a variety.

Farmyard dance. This is a disc shown at Oxford in 1928, which I at first made only of cardboard, but can equally well be of metal, and which revolves in a horizontal plane on the floor of the instrument. Little toy animals of the farmyard type are arranged upon it at a little distance from the center, so that, as the disc rotates, those under one eye move away from the observer and those under the other eye toward him. The instrument brings the two groups together, so that they appear to be all mixed up, but moving in different directions. The active motion helps to enliven the eyes, both of which are seeing moving objects. To prolong the exercise, it is best to have, say, a duck dance first, and then a dog dance, and so on, allowing the child to place the animals.

Baths, tea trays, etc. Children are rather more interested in solid objects than in pictures, and it is quite easy to fasten a little celluloid bath, for instance, to a piece of cardboard on the picture carrier, and to let the child have a tiny celluloid baby before the other eye to apparently put into it, with the accompanying soap, sponge, and so on. Or a tea tray can be affixed to another card, and a small tea-set be apparently placed on it by the other eye.

Note on stereoscopes. There is no reason why the "hand and eye" principle should not be turned to account with ordinary stereoscopes, since the child can be asked to point out details of the picture with a finger of the hand which lies nearest to the amblyopic eye, after which he can indicate the finer details with a white pointer like a bone knitting-needle. A little wiggling of the pointer soon attracts the attention to it if its image fades.

I find a sheet of metal, placed in the picture carrier as a backing to support a flimsy stereogram, is an advantage for rough children, since it prevents them from bending or distorting the pictures.

At first a finger on the side of an amblyopic eye will tend to travel across the midline to the picture in front of the good eye, but it must not be allowed

to do so. With the good eye covered, the finger of the amblyopic eye should be placed on the most striking object of the picture before it; then, on gradually restoring the good eye to vision, the disappearance of the amblyopic picture will be delayed more and more as the practice proceeds. The amblyopic picture can at times be illuminated by an ordinary flash-lamp.

Now for a few **general considerations.**

I need hardly add that squint-training is not a single-handed affair, but is greatly helped by the four already familiar measures, refraction, occlusion, prisms, and operation, to which it in turn is helpful.

(1) The full correction of refraction goes without saying. Bifocals, with about 1.5 D. added for the reading portion, have the double advantage of lessening accommodation and its associated convergence, at reading distance, and in distant vision of compelling the eyes to look a little higher than they otherwise would do, thus bringing into play the well known tendency for squint to lessen on looking up.

Prolonged continuous occlusion of the fixing eye should, if possible, precede the training, the occluder being transferred to the squinting eye during school hours. During the first part of the training it is also valuable, until the fusion faculty is awakened fully. Then the correction of hyperphoria by prisms is important. Javal's plan of never letting both eyes be naked at the same time is undoubtedly based on right principles, since for all the time that the "good" eye is free it is inhibiting the vision of the squinting eye and confirming its amblyopia. It is true that parents, loving to enjoy the little faces of their children, naturally object to occlusion, but with judicious explanation they should be sensible enough to see that the future is more important than the present.

There is no need to wear a completely opaque occluder. One made of translucent, slightly milky celluloid would be best, almost allowing the eye to be seen through it, and yet sufficiently impairing the form sense to stultify the vision. The shell, like Mr. Doyne's occluder, should, however, completely surround the eye, allowing no chink.

I would suggest that in most cases "amblyopia ex anopsia" is a misnomer. In such cases the suppressed vision of a squinting eye is not due to want of seeing (anopsia) but to seeing too much, and because its vision is a nuisance the brain blinds it. It would, I suggest, be more truly called "amblyopia ex dysopsia".

(3) Temporary prisms, combined with the child's lenses, to lessen the amount of squint subjectively, are of great value as soon as fusion desire has been awakened, or has been acquired with instruments. They lessen the jump to permanent fusion.

(4) Lastly, when best to operate is a difficult question. When nonoperative means are given the first innings, and prove almost certain to be unsuccessful, or to require so long a stretch of time as to jeopardize eventual efficiency of the brain-eye, operation is desirable as soon as it becomes inevitable, regardless of the youthfulness of the patient. If good strong fusion is obtained and strengthened by exercises, there is little or no fear of the eye turning outward in later life, though in the case of very young children it is perhaps prudent to mention the possiblity that a final adjustment may be necessary in a few years' time, owing to the early age at which the operation was performed. The youngest patient on whom I have operated was a boy aged sixteen months, who had a squint of thirty-five degrees. I sometimes wonder if so bold a venture deserved so good a result, for the eyes have been straight ever since! He was of course much too young for squint training.

Glenartney, Poole road

TRACHOMA AMONG THE INDIANS

Report of the Advisory Committee of the American Ophthalmological Society

WILLIAM H. WILDER, M.D., F.A.C.S.
(Chairman)
CHICAGO

This committee report approves in the main the findings and criticisms contained in the report on Indian administration by the Institute for Government Research. Exception is taken to the idea that trachoma is a food deficiency disease. Indiscriminate resort to tarsectomy in the treatment of trachoma is condemned. Failure of the Indian service to provide adequately for medical care should be remedied by transferring the management of health matters among the Indians to the United States Public Health Service.

Since the last report of this committee there has appeared an exhaustive report on "The problem of Indian Administration" by the Institute for Government Research. The latter report is the result of a thorough survey, conducted by a competent staff under the direction of Lewis Meriam, the former head of the Census Bureau.

This staff of investigators devoted eighteen months to their task, nearly half of which time was spent in the field. They visited ninety-five jurisdictions and studied carefully every phase of the government's work.

Unquestionably this is a most opportune and most valuable survey. It points out the defects of the management of the health of the Indians, on their reservations and in the government boarding schools and hospitals. It stresses the deficiency of fresh food in such schools and the lack of properly balanced rations for the children.

The observations of our committee are in many respects in accord with those described in the Meriam report. However, we disagree with the idea, expressed or intimated in the report, that trachoma is a food deficiency disease, for too frequently it has been seen in well nourished as well as in undernourished persons, and it is by no means a frequent accompaniment of malnutrition.

Some years ago, probably influenced by ill advice, the Bureau of Indian Affairs issued an order requiring that all physicians in the Indian service learn to do the operation of tarsectomy for the treatment of trachoma. This resulted in a wild crusade of indiscriminate operating on the eyelids, even in very recent cases of the disease, and in young children before any other treatment had been used. Some overzealous enthusiasts even went so far as to advocate the operation as a preventive of the disease. The resulting disfigurement of the lids, and the difficulty of making subsequent treatments of the conjunctiva because of the contractions, are apparent in numerous cases that we have observed.

When the evils of this course were pointed out to the former Secretary of the Interior, Dr. Hubert Work, he very wisely issued an order to the effect that the operation of tarsectomy should not be practised except in suitable cases, to be determined by the eye specialist in charge.

In our previous report we commended the action of the government in establishing special schools for trachomatous children, to which would be sent from other schools children affected with the disease, there to be treated until cured and then returned to their original schools. The boarding schools of Fort Defiance (Arizona), Shiprock (New Mexico), and Tohatchi (New Mexico) were set aside as such special centers for the treatment of trachoma.

We understand that the operation of this plan has not been extended and has not been carried out as originally proposed. In all the schools that we have visited trachoma cases are present; they are not sent to the special trachoma schools, and, what is worse, they

are not even segregated but mingle freely with the other children in the dormitory, classroom, and playground. Because of this the disease is known to be disseminated among healthy children.

Doubtless this neglect is due to the deficiency in facilities, equipment and service as pointed out by the Meriam report, and is the result of the inadequate appropriation of the government for the Indian service.

Etiology: In the past year there have appeared two trachoma studies by Ida A. Bengtson, Bacteriologist, United State Public Health Service, in the Public Health Reports of August 24, 1928, which, although not yet confirmed by others, are worthy of consideration. (See also American Journal of Ophthalmology, 1929, August, page 637.)

The first considers the origin and nature of the Prowazek-Halberstädter inclusion bodies in trachoma; the second the experimental production in laboratory animals of forms resembling the "elementary bodies" of Prowazek, and the "initial bodies" of Lindner.

The first study involved the examination of two hundred and thirty cases of conjunctival affections, diagnosed as trachoma by members of the staff at the United States Trachoma Hospital at Rolla, Missouri, together with other material excised from the lids in tarsectomies and fifteen entropion operations. In forty-five percent of the cases studied, inclusion bodies were found. The microscopic evidence in the film preparations and sections seems to show that the inclusion bodies in the epithelial cells originated from rod-shaped microorganisms which tend to occur as diplobacilli.

The development of the inclusion body is due to the multiplication of these organisms in the cytoplasm and the subsequent reaction on the part of the cell against the invading bacteria, in consequence of which they are transformed into small reddish-staining coccoid forms designated by Prowazek as "elementary bodies," with the blue staining "mantle", which represents the partially dissolved portions of the bacteria. The "free Lindner initial bodies" appeared to be pleomorphic, or modified forms of rod-shaped bacteria which have been seen rather infrequently outside the cells, and which occur as blue-stained oval or cylindric bodies stained at the rim and bipolarly. Miss Bengtson's comment in regard to these various forms of "inclusion body", "elementary bodies", and "free initial bodies" seems to be very reasonable, namely, "that they are found in the conjunctiva, which on account of its exposure is very liable to the invasion of microorganisms and must, therefore, be unusually rich in protective substances which are probably lytic in action. These act on the bacteria to destroy or inhibit their growth, and it is not surprising that the latter should be changed into forms quite unrecognizable when compared with those occurring in artificial culture mediums containing none of these substances antagonistic to their growth."

In Miss Bengtson's second study, to quote her summary and conclusion, "it was possible to produce experimentally forms corresponding in appearance to the so-called "elementary bodies" of Prowazek and the initial bodies of Lindner, by the inoculation into the conjunctiva of guinea-pigs of certain gram-negative rod-shaped organisms isolated from the conjunctiva of trachoma cases. A study of preparations made a short time after the inoculations suggests that the 'elementary bodies' and the 'initial bodies' represent modifications of the organisms originally introduced which are brought about through the action of lytic substances contained in the conjunctival fluid (tears) and tissues. The results of the work do not prove or disprove that the elementary bodies, initial bodies, or inclusion bodies are concerned etiologically in trachoma. The study tends to show that these bodies, in all probability, are bacterial in character and that the bacteria from which they originated are rod-shaped in form. The fact of their presence in a considerable percentage of trachoma cases is an indication that they may be of etio-

logic significance, but the question cannot be answered definitely as yet.

On invitation of Dr. Procter, who is one of the members of the advisory committee on trachoma of the American Medical Association, Professor Lindner of Vienna visited America last year. He examined one chimpanzee and eighteen macacus monkeys in the Noguchi laboratory and pronounced that they did not have trachoma but a typical folliculosis, basing his opinion on his observation that the conjunctiva between the large prominent granules was pale and clear and that there was no conjunctival secretion.

Later he travelled to Albuquerque to visit the Indian school there. As it was vacation time, only eighty of the usual eight hundred children could be examined, and of these he found twenty had trachoma and none had folliculosis. In all of these twenty cases he found inclusion bodies and initial bodies.

He had the opportunity to examine four of the five cases that Noguchi had used for his experiment, and of these he pronounced that two had typical trachoma and two a normal conjunctiva. Whether these latter had had folliculosis or a mild trachoma that had been healed was not determined.

Among all the cases he examined he found only two with pannus. Our own observations of the relative infrequency of pannus in the trachoma of American Indians are in accord with those made by Lindner. (Report of the Ophthalmologische Gesellschaft in Wien, meeting of February 18, 1929. Klinische Monatsblätter für Augenheilkunde, March, 1929, page 399.)

It is thus quite obvious that the problem of the etiology of trachoma has not yet been solved. However, we understand the Rockefeller Institute is ready to release its material for further study, and two investigators are now at Fort Defiance, under direction of Dr. Procter and Dr. Richards, engaging in further experimentation.

Our committee is strongly and unanimously of the opinion that the welfare of the Indians would be greatly enhanced if all matters that relate to their health or to their diseases could be placed under the management or control of some medical body, suitably equipped and organized to take care of such matters. Such an organization we already have in the United States Public Health Service, which has a record of efficiency that is in striking contrast to the dismal failures of the Indian service.

Almost none of the hospitals in the Indian service come up to the standards set by the American Medical Association or by the American College of Surgeons.

Therefore your committee unanimously recommends that a transfer of the management of health matters among the Indians be made from the Indian medical service to the United States Public Health Service.

In the event of that being brought about, and we have reason to think it may be, it seems there would no longer be any use for the existence of an advisory committee, which we have reason to believe is not especially requested by the present Secretary of the Interior, as it was by Dr. Work, so the Committee therefore asks that you accept its resignation.

(The Committee's resignation was accepted.)

(Chairman's address) 122 South Michigan avenue, Chicago

TRAUMATIC RUPTURE OF THE CHOROID WITH DETACHMENT OF THE RETINA: SPONTANEOUS REATTACHMENT

Stereoscopic photographs

ARTHUR J. BEDELL, M.D., F.A.C.S.
ALBANY, NEW YORK

The changes occurring in the course of a case of traumatic choroidal rupture with extensive hemorrhage and retinal detachment, terminating in spontaneous reattachment, are beautifully shown by the accompanying pairs of fundus photographs. **These may be viewed either with an ordinary stereoscope, or through a pair of plus four or five diopter spheres decentered greatly outward.** Photographs demonstrated before the Summer Graduate Course in Ophthalmology and Otolaryngology, Denver, June 17 to 29, 1929.

The surgery of ocular injuries is of engaging interest to almost all ophthalmologists. Since the great war and especially following the inauguration of state workmen's compensation laws, accidents to the eyes have assumed a new interest. Many papers have been presented in relation to the diagnosis and treatment of intraocular foreign bodies, but comparatively few have been devoted to the intraocular changes resulting from the impact of large nonpenetrating objects.

Diagrams and charts have been shown to convey the reporter's impression of fundus changes, although more often only word pictures are used to describe the pathologic processes. Much confusion still exists as to the location of ophthalmoscopically visible hemorrhage, the beginning and end of traumatic retinal detachment, and the appearance of a tear in the choroid. So far as the author knows, there has never appeared in the literature the photographic life history of a traumatic detachment of the retina with a rupture in the choroid. Probably the stereoscopic photographs of this and similar cases will materially assist ophthalmologists in drawing conclusions in relation to the time that has elapsed between the injury and certain residual conditions.

The single instance, taken from many, which will assist in the interpretation of similar cases is that of a twenty-three-year-old male who on April 9, 1928, was struck in the left eye by the closed fist of a heavyweight. He was badly mauled but did not lose consciousness. About three and a half days after the accident he first came under observation complaining of a blur before the left eye.

The right side of the face and the right eye were negative, the vision was 20/20, the pupil was 3 mm., regular and active. The media were clear and the disc distinctly and sharply outlined, without fundus lesion.

The left side of the face showed a very extensive ecchymosis extending from the eyebrow to the angle of the mouth. The left eye had vision of 20/70. The 4 mm. pupil responded slowly to light stimulus. There were many dense floating clouds in the vitreous, with a thick, blood-stained film in the lower portion of the fundus.

By reference to photograph 1, this cloud of varied density can be well seen. The darkest regions are thick blood clots occupying three layers. The one at the lower edge of the disc is in the retina. A horizontal streak about two-fifths of the disc diameter below it and to the nasal side is in front of the retina, as is a larger clot which forms the temporal border of the smudge. The third layer is beneath the retina and consists of very dark blood which lies on the choroid and a few gray less definite blood infiltrations which lie between the retina and the choroid in the subretinal space. The disc is edematous and only the temporal portion of it is demarcated from the surrounding retina. The vessels are of normal size and distribution. The central excavation is small because of the encroachment of swollen nerve fibers. The lower one-fifth of the retina is detached. The fluid is murky but sufficiently clear

Number 1

Number 2

Number 3

Number 4

Fig. 1 (Bedell). Traumatic rupture of the choroid with detachment of the retina: spontaneous reattachment. (See instructions for viewing, in introductory abstract at top of article.)

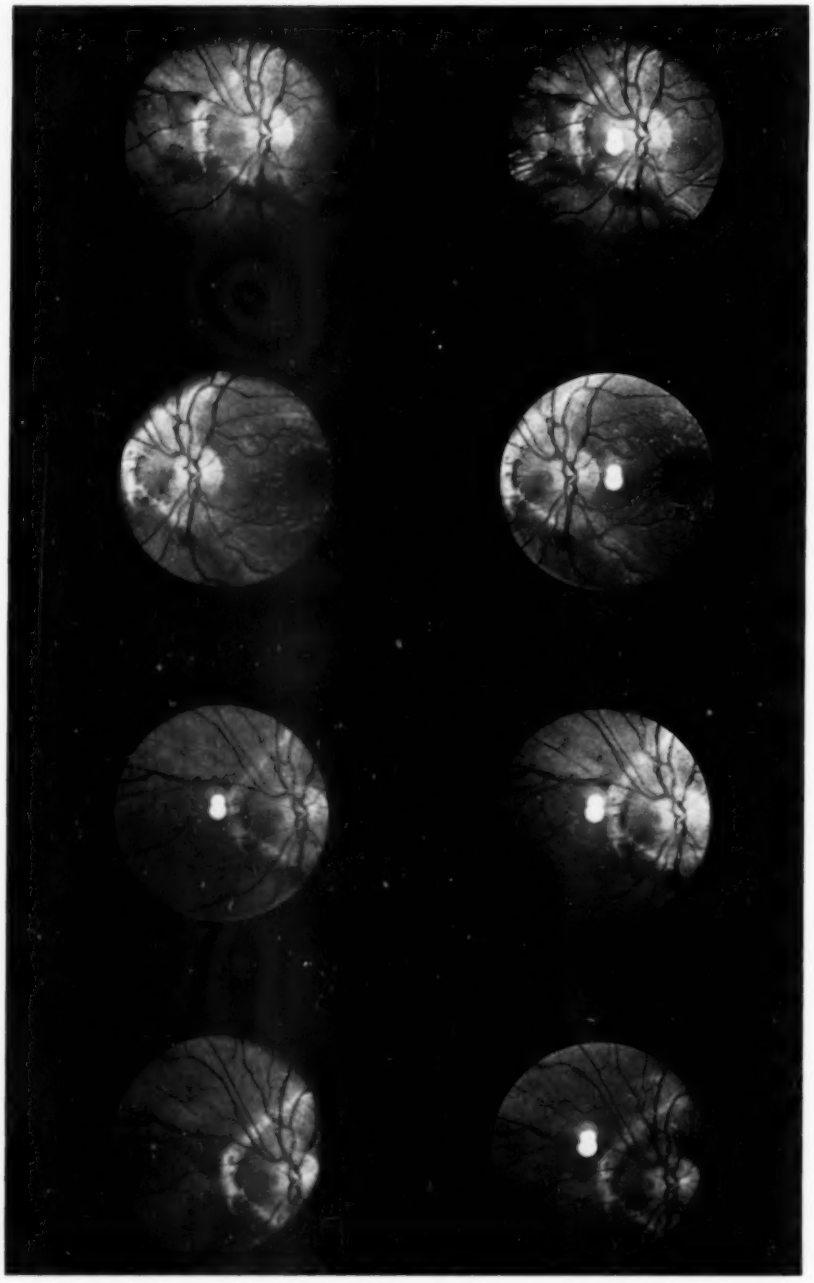

Fig. 2 (Bedell). Traumatic rupture of the choroid with detachment of the retina: spontaneous reattachment. (See instructions for viewing, in introductory abstract at top of article.)

to enable us to see the blood clouds. The vitreous reflex overlying the macula is larger, thicker, and flatter than normal, and radiating retinal reflexes are found about this region. The inspection of the nasal half of the disc shows an indefinite grayish, somewhat crescentic depression partly encircling the disc and especially prominent about one disc diameter to the superior nasal side of the nerve head. (Photograph 2.) The lower portion of the nerve is obscured by the vitreous hemorrhage which has floated upward. In the upper nasal fundus there is a **C**-shaped ring of blood with a crenated border, somewhat removed from the disc. The lower end of this obliquely placed **C** merges with the vitreous hemorrhage. Overlying the region enclosed within this **C** are flocculent hemorrhages in the superficial retina and the vitreous adjacent to it. The **C** itself is in the deeper retinal layers. There is a measurable separation of the retina throughout the entire region photographed in this picture, and a gray, faintly edematous haze is well outlined in a triangle whose apex is near the upper end of the **C.**

On the following day, the blood in the vitreous was beginning to be absorbed, the edema of the retina was lessened, and concentric diverging rolls were noted in the retina. There was a perceptible change in the vessels; the arteries, especially the superior nasal branches, were contracted, with irregular caliber.

April 16th, three days after the first photographs, there is a more definite gray edema of the entire fundus. (Photograph 3.) The swelling is, however, reduced and the disc can be outlined. The fine concentric retinal lines are in front of the larger retinal vessels. The hemorrhage in the lower portion of the vitreous is almost entirely absorbed, so that through the detached retina the subretinal clots are more easily distinguished. The edge of the choroidal rupture is filled with blood and a lower extension of the break is faintly seen near the inferior nasal edge of the disc. The retinal detachment is clearly demonstrated in the inferior portion of the fundus and also over the extensive choroidal rupture.

On April 19th, ten days after the accident (photograph 4), the vision has improved to 20/40, the central portion of the fundus shows the more clearly outlined nerve head, the more definite central excavation, the more pronounced contraction of the nasal arteries and the persistence of both the radiating lines extending from the macula and the concentric rings about the temporal side of the nerve. The retina is beginning to assume its normal position, there is very much less fluid in the lower portion of the field, but only slight absorption in the region of the rupture. The inspection of the nasal half of the fundus shows a large, wide rent in the choroid which roughly conforms to the outline of the disc. This tear consists of three distinct portions, one a wide arc curving around one-third of the disc, another a short angular extension in close proximity to the nasal inferior disc margin, and the third an oval which is obliquely up and in from the larger rent. Some granular blood lies in the vitreous over the retina to the nasal side of the rent. The **C**-shaped hemorrhage is being absorbed, becoming thinner, and occupying less space while in certain parts it is granular.

April 23rd (photograph 5), the only remaining vitreous blood is evidenced as a granular almost vertical line. This is found to be between two pale areas in the choroid which are inside of the **C.** This **C** is now broken into a granular arc the lower part of which is a dark blood area. The detached retina is less prominent and the blood overlying it has been absorbed, but a group of the deeper subretinal clots remains. The ruptures in the choroid are more evident, although the inferior point is still hidden beneath the blood. The disc is sharply outlined in its temporal half, with crescentic folds in the retina. The nasal half is dimly discerned. The lip of the rupture nearest the disc is becoming pigmented and the nasal arteries are distinctly reduced in width. Vision is now 20/70.

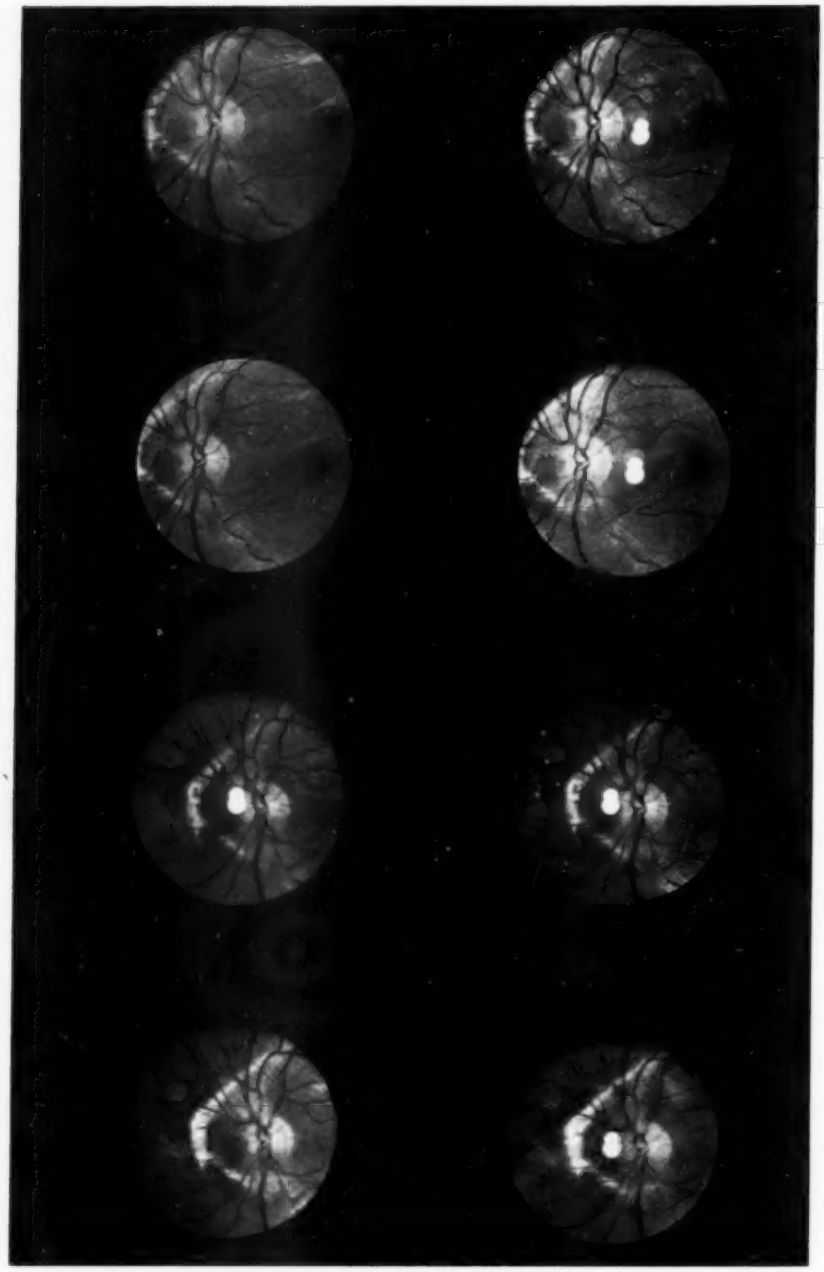

Fig. 3 (Bedell). Traumatic rupture of the choroid with detachment of the retina: spontaneous reattachment. (See instructions for viewing, in introductory abstract at top of article.)

April 28th (photographs 6 and 7), the most striking changes are in the level of the retina, the decrease in the subretinal blood, the restoration of the reflex in front of the macula, and the increased whiteness of the nasal branch of the artery as it goes across the middle portion of the rupture. There is a small arc of granular blood. The retina is still pushed forward and a remnant of the deep clot remains. The past week has shown marked improvement in central vision, which is now 20/30.

May 5th, the nasal side (photograph 8) shows the last vestiges of the C-shaped hemorrhage. The retina is still pushed forward, and two ovoid areas are distinctly outlined in the choroid separate from the rupture. A branch of the nasal artery shows increased perivascular streaks and reduced caliber. The pigment about the rupture, especially the nasal side and the inferior horn, is increased. The central portion of the fundus (photograph 9) shows the decreased visibility of the concentric rings and the presence of the normal diverging retinal ridges seen in the region of the inferior temporal artery. The inferior temporal vein is more prominent, and the dark haze near the lower point of the rupture is the partly absorbed hemorhage beneath the retina.

May 12th, the retina has become reattached, with some fresh retinal edema partially obscuring the inferior temporal artery. (Photograph 10.) The concentric rings about the nerve head are less definite, whereas the oblique radiations are more visible. The nasal side (photograph 11) shows the clearly defined angular rupture of the choroid, with the depression of the scar. Vision 20/15?

The final view taken on June 30th (photograph 12) shows that all the hemorrhages have been absorbed and the retina restored to its normal position. The angular, horn-like projections of the choroidal tear are easily outlined, and the two irregularly ovoid depigmented areas in the choroid are also distinct.

Critical inspection of these stereoscopic photographs will clearly demonstrate the changes recited and will help to establish a time limit for blood absorption and retinal reattachment.

344 State street.

TONOMETRY AND THE VARIOUS INSTRUMENTS EMPLOYED IN ITS PRACTICE

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BROOKLYN

The history of tonometry and of the numerous tonometers devised since the days of Graefe and Donders is thoroughly reviewed, with numerous illustrations and some conclusions as to the essential factors involved.

While the presence of increased intraocular pressure as the essential element of glaucoma was first recognized by Mackenzie about 1830, it is known that Himly and Beer were in the habit of palpating the globes of cases suspected of hardness. Bowman introduced the ratings of +1, +2, +3 for slight increase of tension, decided increase, and stony hardness; and —1, —2, —3 for corresponding reductions. There was much discussion whether the patient should look down when the tension was tested, because this increased the pressure of the lids upon the globe; at least so some said. Against this objection was advanced the interposition of the tarsal cartilage between globe and finger tip if the patient looked ahead or up. Coccius moistened his finger tips in tepid water and palpated the globe directly below the cornea while the patient looked upward. R. A. Fick (1888) suggested the use of a pig's eye connected with a manometer. The clinician could palpate the human eye and then the animal eye, and adjust the pressure of the latter until it seemed comparable with the human eye; whereupon the manometer reading could be made.

Ayres (1904) of Cincinnati suggested the use of the first and second fingers of one hand upon the eye to be tested. These two fingers were placed with the finger nails against the orbit edge and pressure made alternately by one and then the other. He argues that tactile sense is much more acute in these two finger tips and that comparison between impressions of two adjoining fingers is more accurate than between the impressions of a single finger of each hand. "Instruments for this purpose have been devised but they are of little value for every day work." This comment was made a year before Schiøtz introduced his tonometer, that may be said to have changed the examination procedure for ophthalmologists all over the world.

Helmholtz introduced the ophthalmoscope in 1851 and the mystery of glaucoma and other diseases without outward signs was cleared away. In this process, no one had a more prominent part than Graefe. But Donders, Snellen, and their associates in Utrecht were quite as forward in the study of glaucoma, at least. Neither of these two groups was satisfied with the finger method of recording intraocular tension, and both tried to solve the problem then uppermost in their minds. The instrument designed by Graefe rested upon the orbital margin at three different points. By a second-class lever arrangement, a small rod was pressed against the eye and the amount of pressure necessary to overcome the resistance of the globe was read on the scale. The instrument never came to the prominence that one would expect for an effort of this great mind, because the eye must remain immobile during the test and chloroform narcosis was therefore necessary. Donders and Snellen were occupied with the same problem, and the products of the Utrecht clinic were based on sound principles, as we shall see, with an organization evidently better coordinated than the Graefe clinic in Berlin. Donders divided some of his responsibilities with Snellen, and other men of capacity like Haffmans and Hamer worked in the clinic and faithfully did their part.

An excerpt from a letter written to Graefe by Donders will be inserted here because of its historical value and the concise and practical discussion of the

problem of measuring intraocular pressure. It is dated June, 1863.

"In relation to glaucoma, I could not expect that my view of the noninflammatory nature of the disease would seem to you sufficiently well grounded. You require proof of increase of intraocular pressure by irritation of nerves in actual experiments. As yet I have not done this, but I am in the notion of again taking up this work. For this purpose, an exquisite case of fifth nerve paralysis promises some results. . . . . You know that Snellen's efforts at the Physiological Institute of Göttingen confirmed this idea in great part, but, on the contrary, the experiments of Samuel gave negative results. . . . . What was of particular interest to me was the unusual softness of the bulb, that according to the formula of Bowman would be recorded as —2. On the sound side the tension was normal. I regret to say that the tension cannot be given in figures. I have turned over in my mind the construction of an instrument wherewith tension might be measured, and when I talked of this with Dr. Snellen it seemed that our assistant Dr. Hamer had already discussed the construction of a tension meter with him. After some reflection, Dr. Hamer has taken over the details of this construction, and I may say he has done splendidly. In the meanwhile your letter has arrived, saying that you had thought over the same problem and tried to solve it. Thus a need will be felt on many sides at the same time and efforts to satisfy the need cannot be wanting. The instrument that I call the ophthalmotonometer records the tension of the eye in degrees; it tests how deep a small knob is pressed into the sclera by a known weight. The tension meters will be comparable one

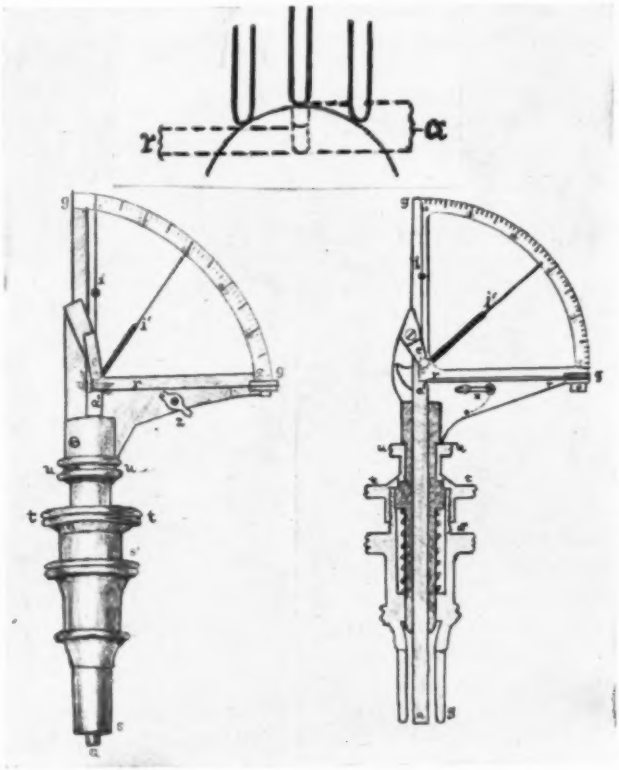

Fig. 1 (Lloyd). Dor-Hamer-Snellen-Donders tonometer, 1865. (Above, measuring the curve of the sclera.)

with another. Particularly important is the determination of the manometric worth of the various degrees recorded by these instruments. The medical candidate Schurman is even now occupied with this determination, using for the purpose dead eyes filled with water under continuously increasing pressure measured by the manometer while the tension is recorded by the tonometer. Thus the normal and abnormal intraocular hydrostatic pressure and its relation to blood pressure will be learned, under various conditions; for example, during eye movements. The use of the instrument is without pain and can be repeated at will. For the determination of tension in case of various growths it will be most important".

Graefe published this letter in the Archiv für Ophthalmologie, demonstrating his broad-mindedness. Donders showed the instrument at the September, 1863, meeting of the Ophthalmological Society. The instrument in the form shown was not entirely satisfactory, as friction was too great to please the designers. Donders then requested Dor of Geneva to obtain the cooperation of the famous watchmaker, Lecoultre, in an effort to construct a more mechanically perfect instrument on the same general lines. This was done, and the instrument in its perfected form is shown here in Fig. 1.

At the same time, it was thought necessary to know the outline of the depression and also the exact curve of the sclera where the instrument was to be applied. This was considered essential in order to determine the position of the impressing rod before pressure was applied, so as to know the exact depth of the indent. To measure this curve, the Utrecht group had evolved the instrument shown in figure 2.

This was adapted from a letter scale and gave the readings in grams of pressure exerted against the eye by the central rod m. The three small rods on either side of m moved very easily in the grooves wherein they were held, and the millimeters of departure from the zero could be read off for each individual rod on the scale of cross lines seen above the cross bar q. This cross bar was attached to the central rod m. There was but one objection to this plan shown by actual use, and this was the tendency of the little rods to stick to the sclera and to give erroneous readings.

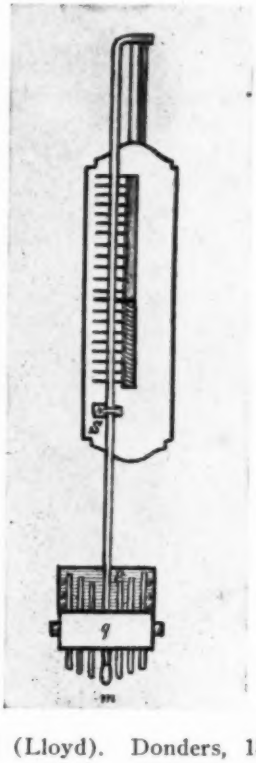

Fig. 2 (Lloyd). Donders, 1863.

The requirements of a tonometer at this time were twofold. The measure of the pressure necessary to make a corneal indent with a fixed weight was the first, but one must also be able to say that the indent was 0.1 mm. deep or whatever standard was considered proper. In order then to say that the minute rod made the indent of a proper depth, one must show the position of the rod when applied to the sclera without pressure. Dor's improved Donders-Hamer-Snellen tonometer accomplished this purpose. The central rod, a, slid up and down in a tube and was connected by cog and wheel with the needle marked i, the other needle i' was an idler and moved with the first

needle until the furthest point was reached, where it was left when the live needle returned to the zero point. The pressure upon the central rod was applied through the spring marked r, and this spring could be put out of action by turning the lever marked z. The upper knurled rim marked t could be turned, and the thread connection between it and the lower part of the casing adjusted the rim of the casing until level with the end of the rod. With the spring out of action, by resting the apparatus upon the sclera the needle would record the height of the scleral curve, the place where the central rod came in contact with the highest part of the curve. The live needle returned to zero, but the idler remained at the point recorded at the first application, giving the hint as to where the reading should begin when the spring was put in action and the instrument applied again.

At the time Dor was getting his instrument made, an instrument along the same lines was made in England by a mechanic named Stroh, working under the supervision of the English oculist, Wheatstone. This was so excellent that Donders particularly mentions this one instrument.

The Dor instrument was presented to the profession in 1865, and was improved two years later by substituting two ivory points, one on either side of the central rod, for the rim that encircled this same rod when the instrument was first made.

The next instrument to appear was that constructed by A. Weber in 1867 (figure 3). He planned to do away with all preliminary maneuvers, to eliminate springs and the friction of the cog wheel, and to reduce the space necessary to apply to the sclera so that the eye need not be strongly adducted. Also, he aimed to determine the first moment when the resistance of the globe was overcome, believing that only at this point was the true reading obtainable. The metal chamber was lined with a flexible bag containing mercury, which ran up into a fine tube projecting from the top of the chamber and indicated the pressure against degree marks behind the mercury column. An ivory rod projected from the metal chamber below and was in contact with the bag holding the mercury above. When the design was first presented, 4 mm. of mercury was the highest reading possible, but Weber expected to do better later.

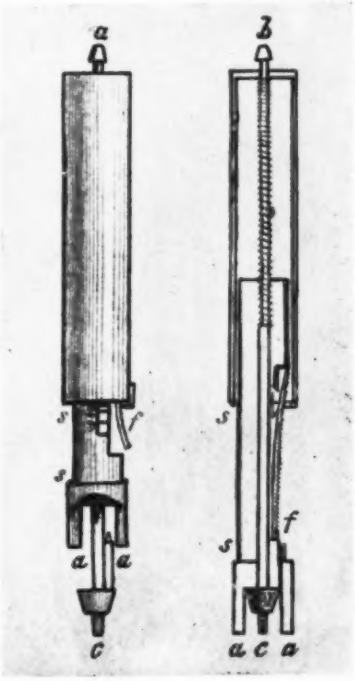

Fig. 3 (Lloyd). Weber, 1867.

As a result of his experiments, Weber thought the aqueous chamber pressure and that of the vitreous might be very different, as they were separated from one another by a diaphragm composed of the lens, its attachments, and the ciliary body. For this reason, he said corneal tension was lower than the scleral by nine degrees in the lower pressure stages and two degrees when the intraocular pressure reached 180 mm. of mercury. He also found a stage whereat the tonometer readings hesitated while the manometer continued to rise, but later the two readings again began to correspond. He later changed the device to the form shown in figure 3, so that a spring would hold the cen-

tral rod and the two lateral supporting points where they were when the central rod had made an indent of the required depth. The illustration shows the Weber instrument in its later state, without the mercury column indicator but with all of the other refinements.

Monnik described his tonometer in his thesis of 1868, but not until 1870

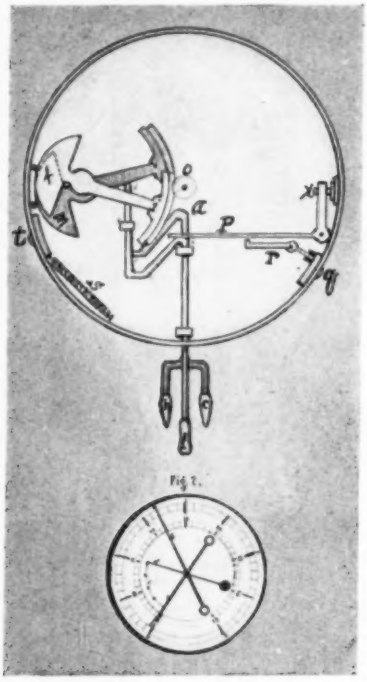

Fig. 4 (Lloyd). Monnik tonometer, 1870.

did he show it at the Ophthalmological Congress. Figure 4 shows the instrument built like a small watch. On the face are two pointers, each with its scale. The outer scale with the longer pointer (b) is designed to show how deep is the indent made by the central rod, while the inner scale and the smaller needle register the pressure by the number of grams employed in the test. The smaller needle (a) is attached to a second shorter needle (d) by a narrow band that is graduated on its surface in millimeter tenths. This enables the observer to note the grams of pressure and the millimeter tenths of indentation with the same glance.

The reverse of the instrument shows the connection between the central rod marked f and the equilibrated contact geared in turn with the smaller needle while a similar equilibrated contact is geared to the longer needle. The central rod is in contact with a spring marked p that can be lifted out of action by the slide marked q. The spring is tested and the readings, in grams, of the small needle regulated by comparison with an accurate scale. When the spring is out of use, the scleral curve can be measured as with the other instruments already described. Two slides (t) on the opposite side of the case permitted readjustment of the needles to zero.

It is to be noted that the two needles remained where they recorded, as there was no fixed connection between the needles and the sliding rods so as to permit the user to concentrate upon application of the instrument to the globe and to leave the reading for a more favorable moment. The two lateral knobs attached to the same sliding rod have points 0.5 mm. in diameter. The central knob tip is 2.5 mm. in diameter and only this rod is connected with the spring. The lateral pair are under no pressure and allow exact determination of the depth of the dimple made by the central knob. The weight upon the central rod at the initial position is 5 gm. and further increase is read off on the inner scale. To test the loss by friction, Monnik placed the central prong of the instrument in contact with the pan of a delicate scale, and found that a 0.3 gm. weight would balance the needle while a 0.4 gm. weight moved it back. He calculated the friction loss as equal to 0.1 gm. He also tested the two lateral prongs in the same way and found that 0.5 gm. would balance the recording needle connected with them while 0.6 gm. moved it back. Here again he counted the friction loss as equal to 0.1 gm.

With the tonometers at his command, Donders experimented with recently dead eyes. The manometer needle ran through the optic nerve and the tonometer reading was taken on the sclera.

He found 40 mm. of mercury as the normal ocular tension soon after death, and the scleral tension 2 mm. from the cornea to be 2 mm. higher than 10 mm. from the cornea. The scleral tension varied with age, as this covering becomes more rigid after the fiftieth year. His results follow:

10-20 years, average 12 gm.
20-40 years, average 12.5 gm.
40-60 years, average 14.6 gm.

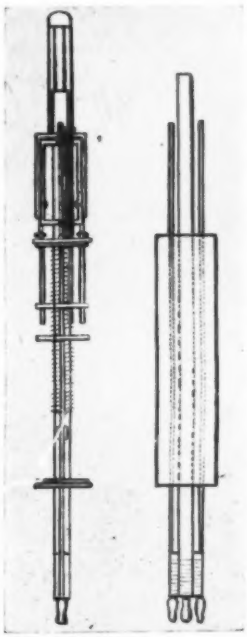

Fig. 5 (Lloyd). Snellen tonometer, 1873.

Using the tonometer, he found no measurable difference in tension between adjustment for near and far. Manometric measurements of simultaneous anterior and vitreous chamber pressure ran alike for varying degrees of pressure.

Snellen came to the conclusion that it was a mistake to have a fixed connection between the two lateral rods, and he designed an instrument (figure 5) which he showed in 1873. He argued that, if the tonometer was applied radially with one rod near the cornea and the other some distance away, one would sink in more than the other and the central rod would stand obliquely and give a false record. The illustration shows the two lateral rods moving independently, as does the central rod, but when a predetermined pressure is applied a mechanism locks all three rods in the positions they have assumed and the reading can be made at leisure while the user of the instrument can concentrate upon placing the apparatus upon the globe accurately. If it was preferable that the locking mechanism should operate at another pressure than 20 gm., an adjustment was supplied to make this possible.

Dor modified his instrument, and in 1868 reported the results of his investigations, which may be interesting here. He tested 100 dead human eyes, and gives 25 to 29 degrees on his instrument as the normal, which he says equals 37 mm. of mercury. The indent was 2 mm. deep. He found lowered tension in phthisis bulbi, irrespective of the cause. Keratitis, iritis, and iridocyclitis might have higher, lower, or normal tension. A case of detachment of the retina with 31 degrees tension made him think of intraocular tumor. In normal eyes, the tension fell 1 to 3 degrees after atropin instillation. After iridectomy, the tension fell 5 degrees at the eighth day. He cut the sympathetic nerve in horses without more than 3 degrees rise, and tying the jugulars had but little effect. Cases diagnosed as glaucoma had tensions of 30 to 42 degrees, which amounted to manometer readings of 60 to 250 mm. He could find no relation between cataract and tension but believed conical cornea was connected with increased pressure within the eye. After cataract operations, the tension was usually normal, but if it rose glaucoma was the cause. Myopia with sclerochoroiditis, in the later stages, was found to have a pressure rise in some cases. He concludes his essay in this way: "The tonometer in its present form is yet so far removed from exactness that it cannot be regarded as mathematically correct, but on the contrary it is sufficiently exact for practical and clinical use".

Maklakoff (1885) was the first to depart from the original plan of making

an indent in the sclera: instead he applied his instrument (figure 6) to the cornea and planned to measure the area of the cornea flattened by contact with a flat ground-glass foot-plate, under a

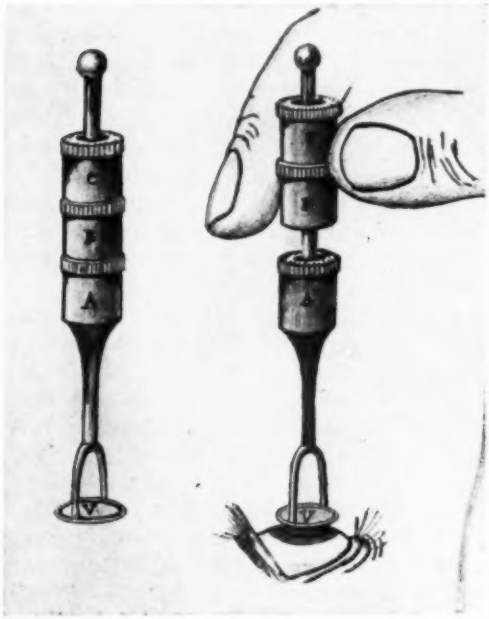

Fig. 6 (Lloyd). Maklakoff's original tonometer, 1885.

definite weight. If the eye was hard, this area would be smaller than in those cases with normal or lowered tension. While he could judge of the size of the contact area by the change of color as seen by the observer from above the foot-plate, he used an anilin crayon to coat the foot-plate. When this came in contact with the moist cornea, the outline was clearly recorded for later examination and recording. He could thus give his whole attention to applying the instrument correctly. His first instrument had two sliding weights upon the central rod (marked B and C). Holding the instrument by both of these, the weight upon the foot-plate was 10 gm.; if held only by C, 5 gm. were added to the previous total.

Some years later he changed the instrument (figure 7) to a double cone with apex to apex. The contact surface was as before, of ground glass, and the holder was a sort of buttonhook, as the illustration shows. Instead of the anilin pencil, he coated the glass with Bismarck brown rubbed up to a thick mass with glycerine and water. After the contact was made, a piece of paper was moistened with alcohol, and the foot-plate pressed against it while it rested upon a rubber mat. He also used an eosine-glycerine mixture. A group of records (figure 8) of various types of pressure are shown to give an idea of the efficiency of the method. Maklakoff soon made another change in the shape of the weights and this type is also to be seen in the illustration. As the rose is not yet thornless, so this method was less valuable if the eyes were suffused with tears or if the eye moved or if the contact was not neatly made. Ostwalt devised the following formula in order to change the value of the different diameters from millimeters of width to millimeters of mercury height:

$$\text{mm. mercury} = r^2 \frac{10000}{\pi - 13.6}$$

With these figures, the average value of normal tension was found to be 25 mm. of mercury.

Lazerat introduced his apparatus the same year. It rested upon the upper and lower margins of the orbit and the style was pressed against the cornea by

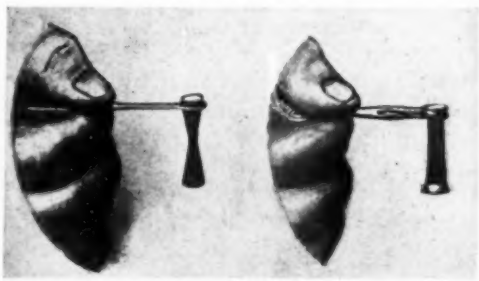

Fig. 7 (Lloyd). Early and later model of Maklakoff's applanometer, 1892.

a spring; the scale measuring the indent was upon the shank of the rod. It could be used with the patient sitting upright.

The next year, Galezowski offered his

instrument, but I have not been able to find a description of it in the literature available.

three different pointers in order to make a reading. In 1887, he made a more simple device which is here illus-

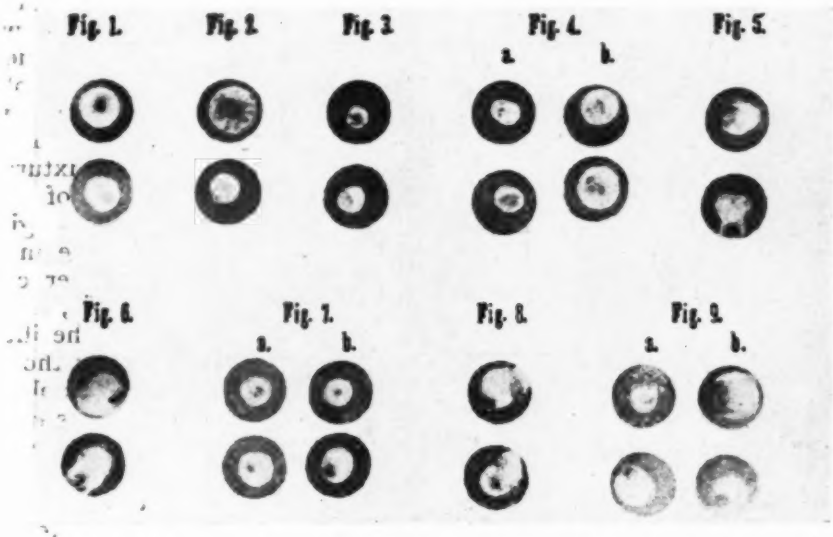

Fig. 8 (Lloyd). Records: 1, normal; 2, hypertension; 3, high tension; 4, before and after eserin; 5, spoiled by tears; 6, same; 7, atropin effect in glaucoma; 8, eye moved; 9, before and twenty years after operation. (Right eye soft.)

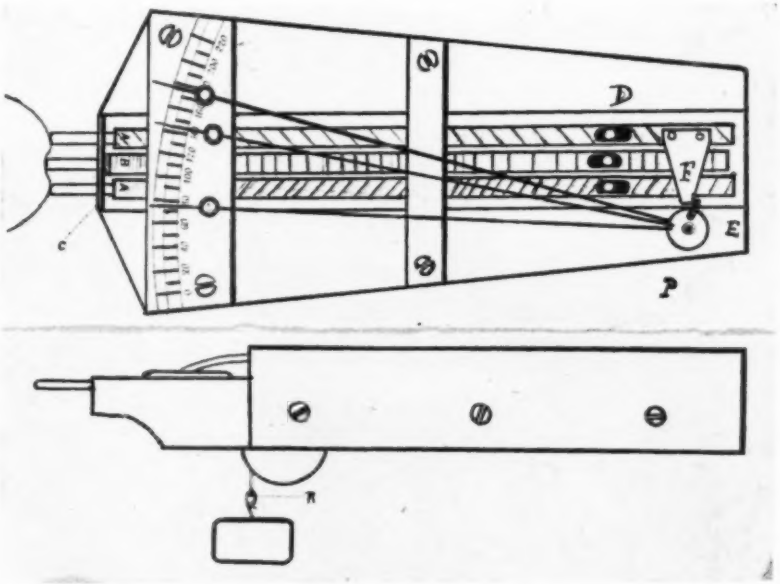

Fig. 9 (Lloyd). Priestley-Smith tonometer, 1879.

Priestley Smith made a tonometer in 1879 (figure 9), and it was indeed a complex affair, as the user must watch

trated (figure 10). The cross piece C was connected with the upright R by a joint that permitted free movement on

the part of each, and the cross piece was in turn connected by a wire W with the indicating mechanism which registered the millimetric depth of the indent made by a definite weight, or in other words the difference in positions of the rod R and the cross piece C after the rod had indented the cornea. The counterweight applied to the upright rod is indicated at L. This instrument was to be applied to the sclera.

A. Fick (1888) introduced a new idea (figure 11) with his applanometer. He argued that, in addition to the pressure within the globe, the rigidity of the envelope at the point of application, and its elasticity that made room elsewhere for the contents displaced by the in-

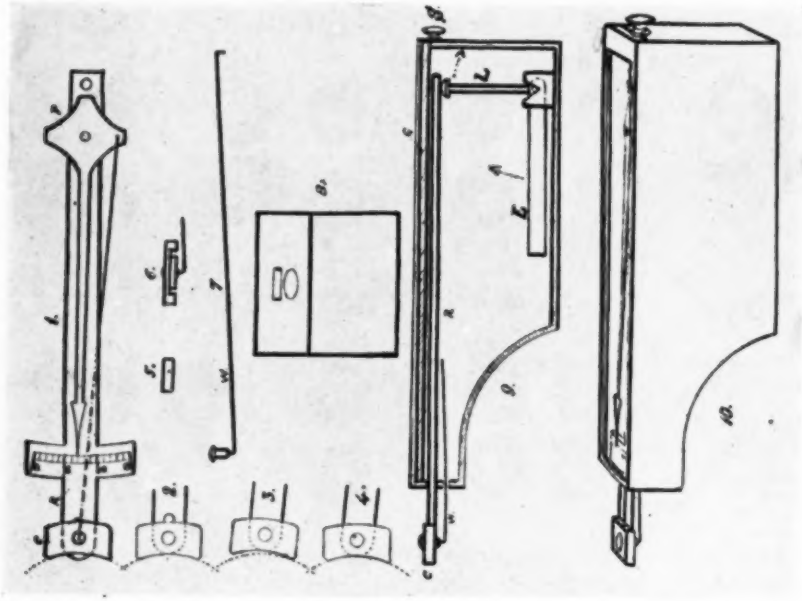

Fig. 10 (Lloyd). Priestley-Smith's new tonometer, 1887 (Ophthalmic Review, volume six, page 33.)

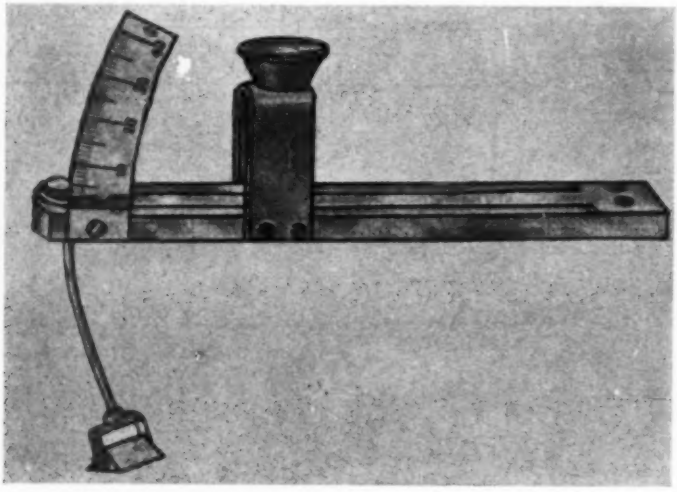

Fig. 11 (Lloyd). Fick-Lifschütz, 1904.

dentation were important factors and to a large extent so variable as to make them unknown factors. He wished to eliminate them from the problem and thought he could do so by using a flat surface instead of a knob. He argued that, if this flat surface was applied to change the sclera from a curved to a flat surface, in contact with the foot-plate of the tonometer, only the tension upon the envelope from within need be considered. The instrument he designed for this purpose is shown. The scale is divided in divisions equal to 1 gm. each, and each gram equals 2 mm. of mercury. The foot-plate m is 6.8 mm. in diameter and if a weight equal to two millimeters of mercury is imposed thereon a weight of 1 gm. is exerted. The patient's head is bent back and the eye turned far toward the nose, while the foot-plate is applied against the sclera until the latter is flattened out to the edge of the foot-plate.

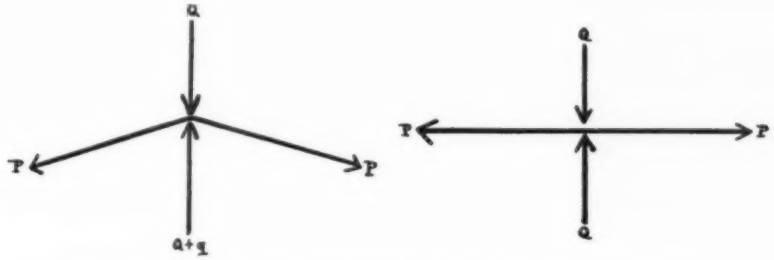

Fig. 12 (Lloyd). To explain the Fick plan for eliminating the element of wall tension.

The relation between wall tension and intraocular pressure is expressed in the following formula:

$$\frac{\text{intraocular pressure} \times \text{radius of globe}}{2} = \text{wall tension}$$

This is of theoretical interest only, as there are factors in the formula that cannot be determined in a living eye. The diagram shows how Fick figured out the elimination of the wall tension and expected to measure only the hydrostatic pressure (figure 12). If the string is stretched by a weight at each end (P-P), wall tension is nil as long as the string is straight, but if the string is bent out of the straight line the wall tension or the tension of the weights P-P enters into the problem. Fick calculates then that, with the foot-plate applied against the cornea until it is flat or in a straight line, hydrostatic pressure only must be overcome and the weight necessary to do this must equal the internal pressure only. Despite this excellent theory, we do not believe there will ever be any exact method of determining the genuine intraocular pressure other than the manometer, but the instruments given us to measure intraocular pressure indirectly are certainly as efficient as we can or ought to expect. While the Fick applanometer may never have gained a prominent place, he and Maklakoff awakened the profession to the requirements of the situation, and their discussions did much to familiarize the profession with the details of a problem that had been considered too complicated for the clinician. The introduction of cocaine was the other important benison that made possible the application of the tonometer to the cornea and led to the introduction of the modern tonometers.

Lachowitsch and Leber (1893) recommended the use of the Fick tonometer against the cornea, but it was not easy to apply the instrument up to the proper degree of pressure and then read the scale.

Koster modified the Fick instrument (figure 13) by adding a spring catch that held the registering device

in statu quo as soon as the foot-plate was on the same plane as the rim of the cylinder in which it moved. The pressure in grams could then be read at leisure.

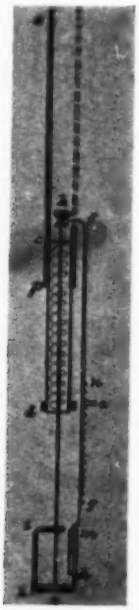

Fig. 13 (Lloyd). Koster, 1895.

Ostwalt wished to avoid the friction incidental to the action of Koster's spring catch, and he attached to the Fick instrument a recording pencil that showed the path of the recording index.

Lifschütz attached a prism to the pressure rod of the Fick tonometer (see figure 11) so that the observer could look into the prism from the side and decide when the cornea was flattened against the entire foot-plate surface.

Gradenigo (1900) arranged his tonometer (figure 14) upon a spectacle frame which held the style against the eye. The eyelids were held apart by a speculum while the patient reclined. The main part of the tonometer was a glass cylinder 44 mm. long within which were two discs with holes bored through the axis, in which the rod applying pressure to the cornea could easily slide. The weights, from 1 to 20 gm., were applied to the end of the rod which projected through the upper end of the glass tube, and to this end was attached the index which magnified the depth of the indent and indicated the tension on the scale.

In 1905 Schiøtz introduced the tonometer that is so well known to everyone that an illustration of it is unnecessary. He returns to the original idea of an indent in the cornea with weights applied at will—5.5, 7.5, 10, or 15 gm. He found the results were more reliable when the readings were made as near to the figure 3 on the scale as possible.

This simply meant that the indent was more nearly the same depth, but naturally a heavier weight was needed for each group of higher pressures. Schiøtz planned the instrument so that the impressing rod had a concave surface continuous with the curve of the foot-plate, but in recent years he substituted a convex curve. The weights were screwed upon the central rod, but the recent model is made with these detachable without removing the instrument from the eye if one so desires. He also put out a model with a semilunar section cut from the upper side of the foot-plate to permit use of the instrument in cases operated on for cataract or glaucoma. This was a really useful idea but seems not to have won recognition. The construction and the foot-plate curve of the modern Schiøtz tonometer are somewhat different from the first, but the simplicity of the instrument is its great asset.

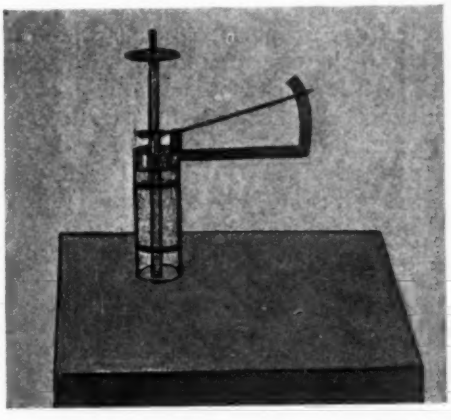

Fig. 14 (Lloyd). Gradenigo, 1900.

(To be continued)

MELANOSARCOMA AT THE LIMBUS

JOSEPH W. MCKEE, M.D.
KANSAS CITY, MISSOURI

A melanotic growth, in active development, completely disappeared within three months after two applications of the thermophore at about 145 degrees Fahrenheit. Read before the Kansas City Society of Ophthalmology and Otolaryngology, November 21, 1929.

I wish to report the following case in order to show the effectiveness of Shahan's thermophore in the treatment of malignancies of the conjunctiva.

Fig. 1 (McKee). On the left, melanosarcoma of the conjunctiva before removal. On the right, condition of eye two years nine months after removal of growth.

The patient, Miss R. C., thirty-one years of age, first consulted me about three and one-half years ago. At that time she had a small pigment deposit located in the conjunctiva near the temporal limbus of the right eye. The deposit was small and had the appearance of a simple pigmented area. There was a history, however, of a similar spot having been removed from this location six years previously. The patient was advised to return if the area showed any signs of activity.

Six months later she came to the office with an active growth located at the corneoscleral junction to the temporal side of the right eye. This was firmly attached at the limbus; was deeply pigmented, being almost black in character; and was extremely vascular. It was soft, smooth, somewhat lobulated, and involved about one-quarter of the circumference of the cornea. With the slit-lamp, the cornea immediately adjacent to the growth showed some cellular infiltration.

The growth was of such size that the largest terminal of the thermophore would not completely cover it. The first application was made April 4, 1927. The temperature was kept at 146 degrees Fahrenheit for two minutes. One month later a second application was made to the area not covered in the first procedure. This was for one and one-half minutes at 145 degrees. There was a moderate reaction but the patient suffered very little discomfort after the first twenty-four hours. Within three months all trace of the tumor had disappeared. The vision in this eye remains 20/20. There has been no recurrence.

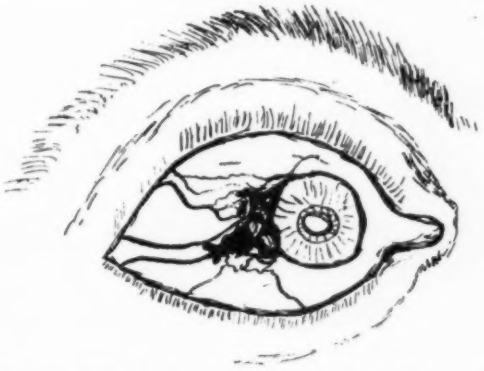

Fig. 2 (McKee). Sketch showing size and vascular structure of growth.

In view of the fact that there was no biopsy, I had five of the leading ophthalmologists of this city verify the diagnosis.

I feel that better results are obtained in the treatment of early malignancies of this region by the use of Shahan's thermophore than by any other method. The procedure is simple, the reaction moderate, and the results entirely satisfactory.

1222 Rialto building.

OPTIC NERVE SURGERY

Anatomical-surgical approach to the optic nerve (preliminary note)

DANIEL M. VELEZ, M.D., F.N.A.M. (Mexico), F.A.C.S.
MEXICO CITY

Upon an anatomical basis, a method is suggested for relieving pressure upon the optic nerve in its canal, by raising the cerebral lobes from the anterior and middle fossæ, and removing with the chisel the small area of bone which forms the roof of the optic canal. Read at the seminar of the school of medicine of Saint Louis University, November 14, 1929. (Professor Velez occupies the clinical chair of ophthalmology in the National Faculty of Medicine, Mexico.)

Various general and cerebral causes produce optic neuritis. Among these causes we find principally syphilis, tuberculosis, hemorrhages, and tumors of the brain. These optic conditions are accompanied by neuritis with all the phenomena of inflammation. This causes strangulation of the disc, increases the tension of the cerebrospinal liquid, and results in cerebral compression.

The general treatment of this condition, sometimes, is rachidian puncture, as I have mentioned in another paper. This brings about an improvement in the inflammation of the nerve, and I have thus seen relief of the optic neuritis, with marked improvement of visual acuity and of the field of vision. The first puncture, which aids the absorption of drugs, reduces the compression and in addition aids in removing the toxins from the cerebrospinal liquid in such cases.

It is well known that not all of the diseases which attack the optic nerve produce neuritis accompanied by strangulation of the nerve, and it is also well known that those causing inflammation sometimes produce strangulation of optic fibers in two places; first, at the scleral ring where the optic nerve enters the eyeball, and, secondly, especially within the optic canal, which is a small bony tract of one and a half centimeters length. This canal has no extensible walls and is occupied by the optic nerve and its sheaths. Its coverings and the periosteum are continuations of the dura mater which covers the bone.

Frequently venereal patients, especially syphilitics, become totally blind before or during the treatment for strangulation of the optic nerve. This is a distressing fact. The permanent damage occurs before the disease is treated adequately and, therefore, therapy is of no avail in relieving such blindness.

Impressed with these facts, which of course do not account for all of the neuro-ocular pathology, I determined to study in an anatomico-surgical way the anatomy of this region and at the same time to investigate the possibilities of this type of cranial surgery.

The problem I proposed to solve was, first, to reach the optic canal by an extradural route, that is to say, without opening the membranes covering the brain and without harming the large arteries and veins. This method is somewhat as follows:

I break the upper wall of the optic canal and expose the optic nerve by taking out the fragment which forms the upper part of this canal. The appearance of the small fragments obtained by such dissection is indicated in figure

1. The fragments obtained are always of the same size and form. The nerve thus uncovered can be further relieved of pressure by an incision opening its membranes, thus making it possible to apply radium to the nerve or to use

Fig. 1 (Velez). Base of cranium, showing location of bone fragments A and B which are removed from roof of optic canal; and, below, the two fragments with an indication of their relation to the nerve.

some form of medical injection, as may be indicated.

The method which I have worked out on the cadaver I propose to use surgically if general medical opinion deems it practical and scientific.

Method of operation: (1) After proper surgical preparation, I next trace a flap for an ample craniotomy (figure 2). Two lines of hemostatic suture are used, employing a medium sized needle and thread, which will give the best hemostasis and will eliminate the necessity of using many forceps during the operation. The incision between the two lines of sutures is made from the skin to the periosteum. The trephining is done in the usual manner and the bone between the perforations is severed by a chain-saw, the Doyen forceps, or Albi's electric saw. Careful manipulation at this point is needed so as not to injure the middle meningeal artery.

(2) The second step in the procedure consists in carefully lifting the brain covered by its membranes, using one or two large hooks in the form of a spoon. Sometimes it is advisable to make a puncture of the meninges and draw off four or five cubic centimeters of cerebrospinal fluid. This procedure relieves the intrameningeal tension, making it easier to lift the cerebral lobes with all of their coverings.

(3) The third step in the procedure is based on the following anatomic details: The floor or base of the skull is divided, as is well known, into three fossæ, the anterior or frontal, the middle or temporal, and the posterior or occipital. For our purpose we only take into account the dividing ridge or crest between the frontal (the higher of the two) and the temporal.

The crest to which we refer commences at the union of the frontal and the temporal bones and forms two-thirds of the apophysis d'Ingrassias (margin of the lesser wing of the sphenoid) which ends in the anterior clinoid apophysis (anterior clinoid process) covering the optic nerve and protecting the sella turcica in which rests the chiasm of the optic nerve and the pituitary gland. Below this crest and

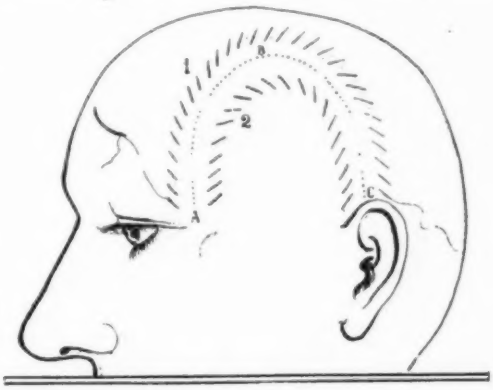

Fig. 2 (Velez). The craniotomy incision.

the optic foramen is found the superior orbital fissure through which pass the following structures: the oculomotor nerve, the cranial parasympathetic nerves, a sympathetic root of the ciliary ganglion, and the ophthalmic vein.

After raising the temporal lobe of the brain with its coverings it is a simple matter to proceed. Palpate with the index finger the crest of the apophysis d'Ingrassias (margin of the lesser wing of the sphenoid) until reaching the extremity or tip of the anterior clinoid process, and then, bringing the finger back 1.5 centimeters, apply a narrow chisel of one centimeter in width and strike the chisel two blows with the mallet; one vertical, on the crest or ridge, and the other with some inclination on the base of the clinoid process at the distance mentioned, 1.5 centimeters. By this method you obtain the small piece of bone of uniform size and shape, as shown in the illustration.

Once the piece of bone is lifted with the forceps, the optic nerve is exposed to view, and it is now only necessary to cut its coverings, beginning with the periosteum which remains exposed when we remove the piece formed by the anterior clinoid process. When this is detached we have exposed the optic nerve lying in its canal, now transformed into a half-canal.

If at this time we do not wish to treat the optic nerve, either by radium or medication, or if we wish to restore its function by simple means, it is only necessary to relieve the nerve of all pressure, thus eliminating its strangulation and preventing atrophy and degeneration.

The nerve in its open canal is later covered by the meninges and by the brain, after we remove the hooks which have held the temporal lobe. There will be no bleeding from the flap of skin and bone when it is replaced and sutured.

It is hoped that this preliminary note may serve as a stimulus to inspire interest in the attempt to enter this risky field of surgery of the optic nerve.

Donato Guerra 11.

SOME EYE OBSERVATIONS IN TUBERCULOUS PATIENTS AT THE STATE SANATORIUM, CRESSON, PENNSYLVANIA

LEWIS P. GLOVER, M.D.
ALTOONA, PENNSYLVANIA

The ocular conditions encountered in one thousand inmates of a tuberculosis sanatorium are numerically reviewed. Special impressions emphasized include the importance of ophthalmoscopic examination of tuberculous patients complaining of severe continuous headache (because of the fact that this may be an early symptom of tuberculous meningitis); and the rarity of phlyctenules in tuberculous children.

During the past year it has been my good fortune from an ophthalmologic viewpoint to be at the Cresson tuberculosis sanatorium, where I had every opportunity to observe the effects of pulmonary tuberculosis on the eye, and also to follow the patients from day to day in a personal manner which is difficult when one is outside. As to the amount of actual tuberculosis of the eye the scientific results are disappointing, but from this very fact one has the satisfaction of knowing how seldom tuberculosis affects the eye.

Some one thousand patients have been here during the year, and when no figures are given reference is made to this thousand as a basis. Adults here are considered as over the age of seventeen years, children as under that age. The adults in nearly all cases have active pulmonary tuberculosis. Twenty percent of the children have active tuberculosis, the remainder are considered malnutrition cases.

Headache is the most frequent condition for which I was consulted. This was usually blamed on the eyes, but in this respect many cases could be ruled out, as very few patients with active tuberculosis do not have frequent headaches. Combine this with long hours in bed and constant reading under poor lighting conditions, and headaches are bound to be frequent. Many of these cases develop muscular imbalance, not of the elevator muscles, but esophoria and exophoria. Refraction gave rather surprising results as to inequality of the two eyes. Of one hundred refractions, in looking over the notes, it was the exception to find a patient whose eyes agreed within one-half diopter. Anisometropia was common. There were only twelve cases of myopia in one hundred refractions. I do not know if the inequality of the two eyes might be due to the general body weakness, or in many cases to never having worn glasses. Of 225 children examined under the age of seventeen years, forty-one or seventeen percent had less than 6/6 vision. Only twenty-one of these were refracted, and all of these twenty-one had high refractive errors.

Conjunctivitis of the chronic form was common, and readily yielded to the use of zinc. Only eight cases of acute conjunctivitis were seen, none of which could be classed as tuberculous. These cases had a bloody discharge as seen in the pneumococcic form, but in no case was any specific bacterium found. Herpes ophthalmica was seen once, and this was the only case of herpes of any sort among some 1000 patients during the whole year. Although herpes is supposed to be fairly common among tuberculous patients, this experience would tend to disprove that belief.

Hysterical amblyopia was seen twice. Both patients rapidly recovered when no food was brought to them and they were forced to help themselves about.

Migraine occurred twice. This and hysterical amblyopia might be expected more often, as many tuberculous patients are highly nervous and brood over their conditions. Both patients with migraine were of a highly nervous disposition.

Retrobulbar neuritis was seen once in 500 fundus examinations, and affected both eyes. As the Wassermann test was negative and no focal infections were found, the attack was attributed to tuberculosis.

Retinitis of a tuberculous nature was

seen once in 500 fundus examinations. This affected the whole fundus, giving an appearance of masses of cotton in and out of which the red tortuous vessels appeared. Vision was limited to hand movements. Only two other cases of massive chorioretinitis were seen, one due to syphilis, the other to focal infection.

Duane mentions that the pupil is often irregular in shape where tuberculosis of the retina is found. This was true in the one case here mentioned, but the other two cases not due to tuberculosis also had the same condition. I have noticed that in many of the cases with active tuberculosis, but having no eye lesion, the iris is more sluggish to light on one side than the other.

Solitary tubercles of the retina were not seen. I examined five cases immediately after death, and twenty-five from a few hours to three days before death, and found no tubercles. None of these cases had miliary tuberculosis. This is similar to the findings of other observers.

Meningitis was observed four times. It is here that the ophthalmologist can be of greatest help in making an early diagnosis. As mentioned before, headache is common in tuberculous cases, but these meningitis cases all complained of a severe continuous headache, not relieved by aspirin, for two to three weeks before other symptoms occurred. I examined each of these cases about one week after headache began, and each had edema of the nerve head of from a half to two diopters, increasing until death. One patient was examined two hours before death and did not show any tubercles of the retina. The others were too violent to observe. It is almost certain that a tuberculous patient with violent headache and edema of the disc has tuberculous meningitis. It is equally certain that death will result.

Iritis of a tuberculous nature was not seen.

Phlyctenular conjunctivitis was seen but twice in 600 children. Both children had rickets. The one child, eight years old, had had the condition on and off for five years. His brother, with advanced tuberculosis and glandular involvement, did not have any eye disease. My father, who for the past sixteen years has been examining these children's eyes on admission, has seldom seen phlyctenular conjunctivitis. To use a popular phrase, an ancient superstition should be abolished, namely that tuberculosis and phlyctenular conjunctivitis are related. These children come in many cases from the poorest of homes and conditions, so if any tuberculous cases were to have the trouble these should. The possibility that rickets has some relation to phlyctenular conjunctivitis cannot be ruled out.

Cataract and lens opacities among the children were the greatest source of surprise. Fifteen boys out of 108, or fourteen percent, had opacities. One had a mature cataract, another a cortical spicule, the remainder showed pinhead opacities of the anterior capsule and of the anterior cortex of the lens. Of 111 girls, eighteen, or fifteen percent, had opacities. One was a zonular opacity, the remainder the pin head opacities of the capsule and anterior cortex of the lens. This was determined by means of a hand slit-lamp. Some of the opacities appeared to be fading, as though they had been larger and had left a ring, inside of which the opacity appeared less dark. A few similar opacities were seen in the adults, but not in nearly the same proportion. Of these boys, eighty-six percent had a positive tuberculin reaction, and seventy-three percent of the girls, as compared with an average of about sixty percent in the remainder of the children. It would seem that malnutrition was a definite factor in the formation of these opacities.

I wish to thank Dr. Theodore P. Appel, secretary of health for the Commonwealth of Pennsylvania, for permission to print these observations.

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CONCENTRIC CONTRACTION OF THE VISUAL FIELDS

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Among nineteen hundred patients in a general medical service, routine examination disclosed one hundred who had marked concentric contraction of the form and color fields. Some of these were related to endocrine disturbance, others to lesions affecting the central nervous system, syphilis, tuberculosis, or hepatic dysfunction. Read before the American Academy of Ophthalmology and Otolaryngology, October 21 to 25, 1929.

This paper deals with the results of an analysis of the eye examinations on a series of 1900 patients who were seen in the course of a general diagnostic service[1]. No selection in these cases was made by the ophthalmologist, the eye examination being a routine procedure on all house patients while the supplementary data came from an outpatient service where the selection of cases for the eye examination rested in the hands of the examining physician with whom each patient first established contact.

presenting marked contraction of the form and color fields, usually concentric and, in a large percentage, symmetrical. Few of these patients disclosed the usually recognized causes of the phenomenon, and the series was allowed to grow until enough cases were available to render a statistical analysis suggestive. Actually there were 102 individuals who presented marked concentric contraction. The present thesis is a discussion of the probable etiology of the condition as drawn from the diagnostic data. To

Table 1

PRIMARY CLASSIFICATION AND DISTRIBUTION

Diagnosis	Total Number	Total Number	+ Percent	Uncomplicated Number	Uncomplicated %	Complicated Number	Complicated %
Endocrine							
Pituitary	565	31	5.5	18	58	13	42
Thyroid	234	12	5.1	2	17	10	83
Gonad	188	6	3.2	1	17	5	83
Other endocrine	39	0	..	..	..	..	..
Total	1026	49	..	21	43	28	57
Nonendocrine							
Lesion central nervous system	100	21	21.0	18	86	3	14
Syphilis	47	9	19.1	7	78	2	12
Tuberculosis	29	13	44.8	7	54	6	46
Liver	77	6	7.8	2	33	4	67
Focal infection	28	2	7.1	2	100	0	0
Other nonendocrine	593	0	..	..	..	..	..
Total	874	51	..	36	71	15	29
Unclassified	223	2*	0.9				

* One silicosis (potential tuberculosis, familial). One amenorrhea (study incomplete).

In any series of examinations made under such conditions, departures from the normal will present for which there is no direct explanation. Analysis of all of the data available from the study of the patient may bring to light suggestions as to the etiology of the presenting condition.

Among the 1900 cases constituting this series there appeared individuals

simplify the subsequent discussion, the primary classification of the series and the distribution of the positive cases may be collected in tabular form.

As will be noted in the above table, about one thousand of the cases presented a definite endocrinopathy as the primary cause of their disability, while nearly nine hundred were equally free from any evidence of endocrine disease

and demonstrated a definite etiology unassociated with the ductless glands. They included cases of tuberculosis, atrophic rhinitis, arthritis, cholecystitis, various primary focal infections, neuroses, psychoneuroses, psychoses, a great variety of primary lesions of the central nervous system, epilepsy, the Parkinsonian syndrome, chorea, mental arrest, malnutrition, obesity, gout, Paget's disease, primary anemia, the leukemias, hemophilia, malignant tumors, benign tumors (including a group of nontoxic goiters), syphilis, asthma, and various diseases of the heart, kidneys, eye, ear, skin, liver, gastrointestinal tract, and pelvis. None of the individuals in the above list gave any evidence of endocrinopathy.

The "unclassified" fraction came chiefly from the out-patient service and were patients who had completed the original investigation but whose etiological classification could not be determined with certainty.

The eye examinations constituted a part of the diagnostic procedure and in two instances, as noted above, gave positive results. All of the positive cases listed above presented a symmetrical contraction of significant proportions in one or both visual fields.

The recognized causes of this phenomenon in the past have been glaucoma, optic and retinal atrophy, hysteria, and certain brain lesions, while concentric contraction with unequal defects has been usually referred to optic neuritis. The one hundred cases showing marked concentric contraction and demonstrably free from these recognized causes are analyzed in the hope of throwing light on the causative mechanism or mechanisms.

The two unclassified patients are noted only in this first discussion and are eliminated from the further analysis. The first was a young man who presented marked field contraction but gave no evidence of endocrine disorder. He had been a quarryman and x-ray of the chest showed the existence of silicosis. The second was a young woman presenting amenorrhea as her chief complaint. It is possible that hysteria was a factor in this case.

Further inspection of the table reveals the following facts: Practically half of the patients (forty-nine) present a primary endocrinopathy. Of the pituitary and thyroid cases, between five and six percent showed contracted fields; while in the ovarian group the incidence was but 3.2 percent. In the nonendocrine series, however, twenty-one percent of those with lesions of the central nervous system exhibited the anomaly, while more than double that percentage of the patients with tuberculosis showed the phenomenon.

Analysis of the hundred cases forming the basis of this discussion discloses the following interesting facts. Fifty-eight percent of the pituitary cases were without significant complication. Only seventeen percent each of the two remaining endocrine groups exhibited that condition as the single cause. Eighty-six percent of the cases primarily presenting a lesion of the central nervous system were uncomplicated; three-fourths of the syphilitics, one-half of the tuberculous patients, and but one-third of the hepatic group.

Table 1a.

ANALYSIS OF POSITIVE GROUP *

Diagnosis	Primary			Secondary			Grand Total
	Established	Probable	Total	Established	Probable	Total	
Pituitary	30	1	31	0	0	0	31
Thyroid	10	2	12	0	0	0	12
Gonad	6	0	6	1	0	1	7
Lesions central nervous system	11	10	21	10	7	17	38
Syphilis	6	3	9	1	4	5	14
Tuberculosis	8	5	13	7	6	13	26
Liver	5	1	6	9	3	12	18
Focal infection	2	0	2	9	0	9	11
	78	22	100	37	20	57	157

From the raw data of this table one might well draw the inference that lesions of the central nervous system and syphilis were patently associated with the eye condition, that pituitary disease and tuberculosis were possible etiologic factors, and that thyroid and ovarian disease together with hepatic dysfunction were not of primary importance and of doubtful causal relationship. Further analysis permits of more exact interpretation.

In assembling the data for this table distinction has been made between established diagnosis resting upon a definite objective basis and the probable incidence of a disease condition in which past history, circumstantial evidence, and other less objective factors are relied upon. It will be noted, for example, that one of the pituitary cases is regarded as probable, while thirty are established; and that two out of twelve of the thyroid cases are regarded as probable. It should be said, however, that in the endocrine cases subsequent therapeutic tests have supported the validity of the initial diagnoses. With the syphilitics, the tuberculous, and those patients presenting involvement of the central nervous system, subjective evidence plays a larger part. Over three-fourths of the cases, however, are classified on the basis of definite establishment, while the remainder possess that degree of probability which would constitute, under ordinary conditions, a well-founded working hypothesis. With the secondary factors the established group contains twice as many patients as does the probable fraction.

One endocrine case shows an endocrine factor as a secondary element. This was the single patient in the series presenting a so-called "pluriglandular" syndrome, which in her case consisted of a dysfunctional state of the pituitary superimposed upon a hypogonadism of surgical origin. The one hundred cases of the series present 157 diagnostic elements. The additional complications, fifty-seven in number, are divided among forty-three cases. Focal infections are included because two of the patients presented no other demonstrable pathology than that single condition; but this does not assume the same degree of importance as do the other four nonendocrine groups. An analysis of the complications is given in table 2.

Table 2

ANALYSIS OF COMPLICATIONS

Primary diagnosis	Uncomplicated	Complicated by					
		Gonad failure	Central nervous lesion	Syphilis	Tuberculosis	Liver dysfunction	Focal infection
Pituitary	18	1	4	2	5	5	5
Thyroid	2	0	2	0	3	5	0
Gonad	1	0	3	0	2	1	2
Lesion central nervous system	18	0	0	0	2	1	0
Syphilis	7	0	1	0	1	0	0
Tuberculosis	7	0	4	2	0	0	2
Liver	2	0	3	1	0	0	0
Focal infection	2	0	0	0	0	0	0
Total	57	1	17	5	13	12	9

The predominance of liver cases in the thyroid group emphasizes the frequent association of hepatic dysfunction with thyroid failure that has been reported elsewhere[3]. A real factor in the seemingly low relative incidence of hepatic disorder is the complication of endocrine disease. The majority of the primary liver conditions with complication show some involvement of the

central nervous system as the second factor. The association of lenticular degeneration with jaundice may be no more than coincidental, but offers a suggestive lead for future investigation.

The relative incidence of each factor irrespective of primary or secondary character may be summarized most compactly in tabular form.

Table 2a.

	Primary and secondary	
	Number	Percent
Endocrine group		
Pituitary	31	19.7
Thyroid	12	7.6
Gonad	7	4.5
Total endocrine		31.8
Nonendocrine group		
Lesion central nervous system	38	24.2
Syphilis	14	8.9
Tuberculosis	26	16.6
Liver	18	11.5
Focal infection	11	7.0
Total nonendocrine		68.2

Lesions of the central nervous system are present in nearly one-fourth and pituitary disease in nearly one-fifth of the total. Tuberculosis also is an evident factor, and over one in ten show some degree of hepatic involvement. It is, of course, possible that the figures for the syphilitics derive from patients in whom the disease has attacked the central nervous system, though only one of the nine cases gave concrete evidence of central neural involvement. If we include the somewhat dubious luetic factor, over fifty percent of the total group present conditions which may be regarded as directly or indirectly involving the central nervous system.

The twenty-one cases in which a central neural pathology was the primary factor showed a wide scatter of conditions, including traumatic injuries, hydrocephalus, the Parkinsonian syndrome, Little's disease, tumors and a variety of others. The head trauma cases, the largest single group, all gave histories of severe injury with presumptive damage to the central nervous system.

In the complete series a number of individuals were classed as mentally defective. With many mental defectives it is manifestly impossible to secure that measure of cooperation necessary for the eye examination. Each such patient was retested a number of times so as to furnish adequate authority for the final report.

From these analyses, it may be concluded that symmetrical contraction of the form and color fields is a phenomenon of fairly frequent incidence, and is apparently associated with a group of disease conditions which at first sight are unrelated.

The majority of the clinical and laboratory findings are of significance only in defining the individual disease conditions involved and, in the individual case, in establishing the diagnosis. For this reason, detailed discussion of the numerous data is unnecessary. General discussion of the methods employed and criteria adopted may be found in a series of papers, of which a list appears at the end of this essay.[1 to 8]

Analysis of the eye examinations

The technique of the eye examinations involved the use of the Peter hand campimeter[9], with a two degree object for form and color fields and a one degree object for blind-spot determination, while the maculæ were checked with the 0.5 degree object for white, blue, red, and green. All cases were rechecked on a Lloyd slate (small), using a wide-angled hand stereoscope, especially to compare blind-spot findings, as well as determine field contractions within the temporal limits of twenty degrees. The 0.5 degree white object was used in the latter procedure, and in most cases larger blind spots and greater contractions of fields were noted with this smaller test object. Test objects were passed from blind to seeing area, and good daylight was the source of illumination.

It is realized that color fields taken by this method cannot be scientifically accurate, so that we have contented ourselves with delineating the red field and noting at the examination where the blue and green limits lay in rela-

tion to the former. It is also appreciated that a smaller test object for form, one degree or less, and standard illumination as with the Ferree-Rand perimeter would have given much more accurate data, but so far as the size of the test object is concerned we have erred on the safe side, namely, that these fields are so much contracted as to come well within our designation. Likewise the criterion of good daylight gave us rather dependable findings[9, 10, 11].

The significant data as to the eye history follow: wearing glasses, 46; visual complaint, 25; inflammations, 7; photophobia, 8; miscellaneous, 14. It will be recalled that the ophthalmic examinations were made routinely and not because of eye symptoms. In practically all cases eye symptoms were a secondary matter and formed no part of the chief complaint.

The visual record was: better than 20/30, 151; 20/30 to 20/100, 38; less than 20/100, 11. Of the only eleven eyes that had really very poor vision, two presented retinitis pigmentosa, one in the group of hepatic dysfunctions, the other in that of tuberculosis. One case in the group with central nervous lesions showed "pepper and salt" pigmentation, coupled with disc changes. A fourth case, found in the thyroid group, had low visual acuity in one eye, doubtless due to refractive error.

The pupil reactions (as to single eyes) were: abnormal reflexes, 15; irregular, 6; unequal, 12.

Ophthalmoscopic examination showed (as to single eyes): yellow discs, 26; yellowish discs, 44; atrophic discs, 3; papilledema, 4; vascular lesions, 17; abnormal retinal pigmentation, 20, including snuff type 4, pepper-salt type 10, retinitis pigmentosa 6; exudates 7.

As would be expected, the greatest pupil abnormalities occurred in the cases classified under lesions of the central nervous system and lues. Enlarged blind spots were found in the groups in which pressure phenomena or nutritional disturbances were most marked, i.e. twenty-two in pituitary cases, six in the group of central nerve lesions, eleven in thyroid series, and seven in cases with tuberculosis. Yellow and yellowish discs were found scattered throughout the series, the more pronounced coloration being found in cases of retinitis pigmentosa, in liver disease, and in patients with pituitary disorders.

Two elevated nerve heads were found. One was in a case of pituitary dysfunction with tumor, in a girl of fifteen years with physical development of ten years but normal mentality. Papilledema of three diopters was found in each eye. Later an operation was performed, with fatal result. The autopsy showed a congenital cystic tumor of the pituitary (cholesteatoma) complicated by a medullary embolus following operation. The other case was in a young woman of twenty-six years, in the group with central nerve lesions and having a brain tumor. She showed loss of all of the right field except a reduced mid-nasal quadrant and ten degrees about fixation, and a left field concentrically cut to twenty degrees. Before a final diagnosis of brain tumor was made, the discs became elevated five diopters and were classified as a questionable papillitis.

Only two cases could be classified certainly as showing optic atrophy. One was in a patient of fifty-five years with thyroid failure who later suffered a severe head injury with possible fracture. In the course of two years her fields were seemingly reduced thereby from an initial concentric contraction to eighteen degrees to ten degrees right and about fifteen degrees left. The discs were pale but clear cut, of the secondary descending type. The contracted fields had so inconvenienced her in getting about that the toes of her shoes were much worn by striking uneven surfaces. The other case exhibited a secondary consecutive atrophy of the left disc, and was classified in the central nerve lesion group. The patient's visual field was reduced to a quadrantic type in the lower nasal area about the point of fixation, measuring about fifteen by thirty degrees, and with vision of 10/40 with glasses.

Vascular lesions were rather unimportant, being mostly of the sclerotic type, and were found in but a small percentage of the eyes. Likewise exudates played but little part in the whole series. Of more importance are the abnormally pigmented fundi found in twenty eyes, always bilaterally. Two pituitary cases showed a "snuff" type, while one central nerve lesion and four luetic patients exhibited quite characteristic "pepper-and-salt" pigmentation. Two sisters in the tuberculous group had marked lesions of retinitis pigmentosa, as did one in the liver group; these were all bilateral.

The conditions as to field contractions (single eyes) were as follows: 35 to 20 degrees, 47; 20 to 10 degrees, 70; less than 10 degrees, 80; nonconcentric, 5; one field normal, 3.

Of nonconcentric contractions, four occurred with lesions of the central nervous system, one being in the left eye described above as a case of secondary consecutive atrophy, another was the right field in the case of possible papillitis of five diopters previously mentioned. A patient with Little's disease, classified in the central nerve lesion group, exhibited fields of about twenty degrees, below the horizontal midline, an altitudinal hemianopic type. The discs in this case showed temporal pallor, and there was marked extraocular imbalance. The fifth irregular field occurred in a tuberculous young woman and was perhaps due to choroidal changes near the disc. This was a left eye, the field being contracted to twenty degrees and not extending below the horizontal midline, again an altitudinal hemianopic type. The right field was concentrically cut to twenty-three degrees.

Three patients each had one normal field; one in the pituitary group had the left field contracted to twenty degrees, and one tuberculous patient showed a right field cut to seven degrees; in neither case could an apparent reason for the monolateral pathology be adduced. The third monolateral case was the one referred to previously in the asymmetric and secondary consecutive atrophy classification.

A surprisingly large percentage, eighty eyes, showed cutting to ten degrees or less, almost as many from twenty to ten degrees, while forty-seven were contracted to thirty-five degrees or less. Only cases whose contraction was greater than to thirty-five degrees were included in the study. The smallest field was found in a married woman of thirty-nine years, in the pituitary dysfunction class, whose vision without glasses was 10/15 and Jaeger 5 right, and 10/15 and Jaeger 8 left; the disc quite yellow, and the field cut to three degrees in each eye.

Discussion

The finding of these contracted fields was of considerable interest to us, particularly because in only a few cases did the patients register any complaint proportional to the marked narrowing of the visual field. One middle-aged woman, as noted above, had been inconvenienced to the extent of wearing out her shoe toes by kicking into unseen surfaces. One young man exhibited no difficulty until suddenly entering an elevator which was higher than the floor level. Most of these patients got about surprisingly well considering their handicap. Only those in whom the field loss was of recent origin acknowledged any inconvenience in orientation.

In several, the first tests made were difficult and misleading because of the shifting tendency which the patients had developed, a facultative defensive efficiency to help overcome their handicap.

The number of cases with frank atrophy of nerve or retina or with a possible element of hysteria (a known complication in one case only) is very small and leaves practically all of the series to be explained upon other bases.

In those cases not presenting some sort of organic interference within the eye itself, the orbit, or the cranial cavity, it seems reasonable to assume a causal influence in some nutritional fault derived from either a local condition or more general metabolic error.

The retina is highly organized neuroepithelium somewhat similar to that within the auditory labyrinth. With the known susceptibility of the latter to toxic agents[12, 13], it seems not impossible that a number of the cases in this series may rest upon an analogous foundation.

Illustrative cases

The following two individual case reports from the series may serve to illustrate certain points developed in the body of the paper.

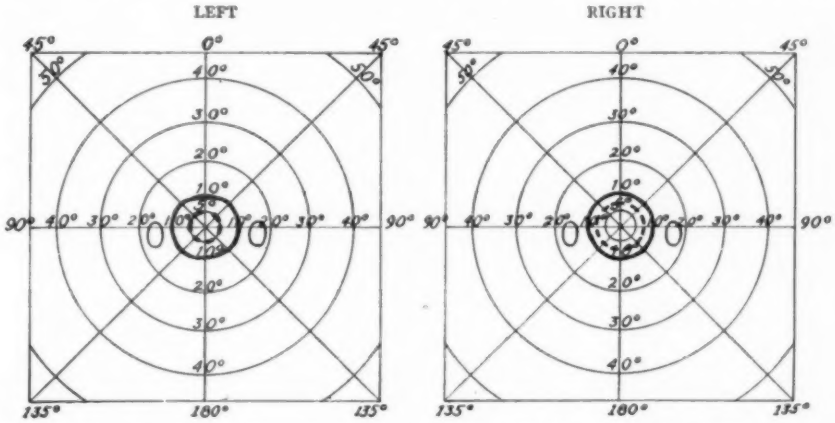

Fig. 1 (Rowland and Rowe). Case S-1483. Fields, June 22, 1927. Form, ———; red, - - - - -

Case S-1483. Mrs. K., aged thirty-five years. Bilobar pituitary failure. The patient's chief complaint was of a marked increase in the interval between her periods, coupled with metrorrhagia. Ten months previously she had skipped a period, and from that time on the interval had increased and become irregular. She had been married for eight years and had borne three children without miscarriage. There was a record of nephritis in her earlier years. Her deliveries had all been by cesarean section.

Beyond slight arthritic changes the physical examination was not significant. She was thirty-six percent overweight, the lung volume was low, the basal rate definitely depressed, the blood pressure somewhat low, the pulse rate slightly high, the urine volume high, the protein intake adequate, the residual nitrogen a high normal. The sugar tolerance test was not completed but, as the patient was negative with a sixty-gram test meal, she was more than fifty percent above her predicted level. The blood uric acid was high, and the blood showed a four percent eosinophilia. There was a slight loss of aural acuity by the audiometer, most marked in the speech area.

Radiographic examination showed a sella normal in shape and size, the right optic foramen oval in shape and 5 by 6 mm. in diameter, the left circular and 5 mm. in diameter. The sinuses and skull were negative.

Eye examination: Without glasses vision was right 10/15, left 10/10, and Jaeger 1 each eye for near point. The pupils showed no pathology and measured 4 mm. The media were clear and the fundi showed only very deep physiologic cupped discs, more marked in the right. Form fields were concentrically contracted to ten degrees each, color fields slightly smaller.

Opinion: With the patient's obesity tending to a girdle type of distribution, a moderately depressed basal rate with somewhat lowered blood pressure, an ample urine, a normal nitrogen excretion, a much increased sugar tolerance, a high blood uric acid, and a four percent eosinophilia, the general picture conforms definitely to that of bilobar pituitary failure.

Case B-518. Miss B., aged fifty-three years. Lesion of the central nervous system following an earlier meningitis. The patient's chief complaint was of bilateral deafness. Thirty-seven years previously she had developed tinnitus in the left ear. Conscious impairment of hearing had appeared only ten years previously and had been progressive. There was no paracusis. Various local treatments had been given without improvement. Recently she had become fatigable, with attacks of numbness in the right arm and about the hips, and occasional pain in the left shoulder. Both father and mother had cardiovascular disease, and the former had been psychotic. She had had diphtheria, scarlet fever, and several operations including one for anal fistula. Eleven years previously she had had "an inflammation of the cornea" which lasted for a year and left a scar which had been but partly absorbed. She was subject to bronchial colds, had many nose bleeds, and had had all of her teeth removed. She complained of flatulency, constipation, and spoke of having had jaundice in childhood. She had occasional nocturia. The menstrual history was negative, including an uneventful menopause at fifty-one years.

She was very deaf, the face showed no muscular paralysis. The pupils were irregular and did not react to light. There was slight ptosis of the right eyelid, a question of a presystolic murmur at the apex with accentuation of the first sound, a slight tremor of the fingers, weakness of the handclasp, pain in the left shoulder joint with some restriction of motion, and the knee jerks were very active.

She was seven percent below her predicted weight; the basal rate was slightly low, as were the blood pressure and the body temperature. The urine showed albumin and casts, an inadequate protein intake, and a high resid-

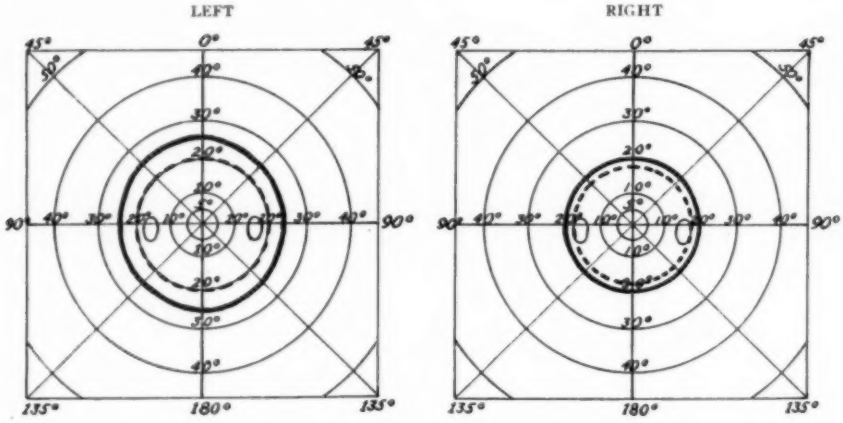

Fig. 2 (Rowland and Rowe). Case B-518. Fields, May 14, 1926, Form, ———; red, - - - - - -

ual nitrogen accounting for the basal rate level. There was a slight secondary anemia.

On neurological examination the patient showed considerable sway in testing station, and the pupils were irregular, unequal, and rigid to light. The face was smooth and expressionless, the speech on test words confused.

The pelvic and laryngological examinations were entirely negative. There was a calcification in the left subdeltoid bursa.

The audiometer showed very marked loss of hearing, more pronounced in the left ear. The spinal fluid was negative except for a typical nonsyphilitic colloidal gold curve, suggesting tuberculous meningitis. The Wassermann was negative.

Eye examination: With glasses vision was right 10/12 and Jaeger 2, left

10/30 and Jaeger 12, the left being less acute because of a central corneal scar. The pupils were 5.5 and 4 mm. in width, slightly irregular, with no reaction to either light or accommodation. Rotations were not limited but convergence was quite insufficient. The right media were clear, but the fundus showed a disc yellow and pale with a hazy center, probably old exudate, a condition probably to be classified as secondary atrophy. The left fundus could not be seen because of the corneal opacity. The right form field was cut to twenty degrees, blue and red coinciding; the left was reduced to twenty-five degrees with red to twenty degrees.

Opinion: There was no evidence here of endocrine disease. The patient obviously had a central nervous lesion deriving from an earlier meningeal condition which was possibly tuberculous in character. There was some kidney impairment and other nonrelated pathology.

Summary and conclusion

1. In addition to the common recognized causes of concentric contraction of the visual fields, such as optic and retinal atrophy, hysteria, glaucoma, and optic neuritis, this study illustrates the fact that several other disease conditions may produce a like result.

2. Of endocrine conditions, disorders of the pituitary seem to exercise a primary influence, and these not necessarily associated with hyperplasia of the gland. All but a very few of the thyroid and gonad cases showing the eye condition demonstrate a complicating disease state such as in nonendocrine cases is found in association with the eye condition. For this reason neither thyroid nor gonad disturbance is to be regarded as of primary importance in analyzing the visual phenomenon, though as factors of minor importance they can not be rigorously excluded.

3. In addition to the endocrine conditions there is a sufficient incidence of eye changes in lesions affecting the central nervous system, in syphilis, in tuberculosis, and in hepatic dysfunction to warrant their consideration as probable causal agents of primary significance.

4. The laboratory studies give clear-cut evidence of functional renal disturbances which are to be interpreted broadly as showing a frequency of metabolic disturbance in excess of that in similar groups without the characteristic eye findings.

5. From the points noted above it seems reasonable to conclude that in patients demonstrating marked concentric contraction of the visual fields the possible presence of any of the above as well as of the commonly recognized entities should be investigated in arriving at a diagnosis.

6. There are apparently many cases of marked field contraction in which the condition has not been detected.

Evans Memorial.

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NOTES, CASES, INSTRUMENTS

COD-LIVER OIL IN THE TREATMENT OF CORNEAL OPACITIES

CHARLES M. STILES, M.D.
PHILADELPHIA

I wish to call the attention of eye physicians to the great value of cod-liver oil, combined with mercury, as the local treatment par excellence for corneal opacities of every description.

I first became familiar with this very valuable remedy through reading an article written by Casey Wood under the caption of "brown ointment" in "A system of ophthalmic therapeutics," edited by the same distinguished ophthalmologist, also from a subsequent article in the same work, under the heading of "follicular conjunctivitis."

After reading the articles mentioned, I at once ordered this remedy from my local druggists*, to be prepared in accordance with the instructions given by Dr. Wood (see the articles mentioned), and placed it on my treatment table to be used from time to time, as suggested by Wood, in the treatment of chronic blepharitis and so on.

After successfully using the preparation in this way for some time, it occurred to me that cod-liver oil, used for many generations with marked benefit as a general health builder for debilitated individuals, could be used equally effectively, especially when combined with the stimulating and alterative action of mercury, to help nature restore, as far as possible, a weakened and debilitated cornea, after the various forms of attack to which that most useful part of the human eye had been subjected.

Acting on this thought, I began to prescribe "brown ointment" in suitable dilutions for various forms of corneal disease, including active ulcerations, traumatic and systemic keratitis, but more especially in opacities following such pathological conditions. On my former service as ophthalmologist to the Frankford Hospital, I also had the remedy prepared and kept in stock, using it frequently as occasion arose, and I believe my successor at the hospital continues so to do.

In recent cases I have found it very efficacious indeed, clearing up moderate corneal opacities in a short time. In chronic conditions, it has also proved very useful; and I have also prescribed it with encouragement alike to patient and physician in old, long standing conditions of corneal disease, especially where further degenerative processes due to advancing age and other causes have developed, with apparent arrest of the degenerative conditions.

The combination of cod-liver oil with mercury for clinical use is now strongly supported by our comparatively recent knowledge of the presence in cod-liver oil of vitamins A and D, these vitamins being now considered in medical chemistry as two of the most important agents in sustaining and promoting healthy bodily functions. In my opinion, therefore, this preparation of Casey Wood's should displace, to a very large extent, the commonly used yellow oxide ointment, for it is obvious that cod-liver oil, in contradistinction to petrolatum, stands out preeminently as a builder of bodily tissue, and, properly diluted according to the needs of the patient it causes no more local irritation than the mineral oil derivative.

The definition of brown ointment as described by Casey Wood is as follows: "This is the name I have given to the dilute citrine ointment of the British pharmacopœia (unguentum hydrargyri nitratis), when prepared with unrefined or brown cod-liver oil, instead of the neat's foot oil of the British or the lard of our own pharmacopœia, and this again diluted with from thirty to fifty percent of refined cod-liver oil. When thoroughly mixed, it should be exposed to the air in a protected jar for at least three weeks, stirring it every day or so, etc., etc." (Wood's "System of ophthalmic therapeutics", pages 436 and 682.)

* Campbell Bros.

It may be useful to add the following further quotation from Casey Wood's articles:

"In the course of a month after preparation, mercuric iodide (or a still more complex organic compound) is formed which joins with some constituent of the oil to convert the mixture into a smooth, oily, seal-brown mass of the consistence of molasses and a decided odor of fish. In winter, or if in full strength it proves too irritant, I am in the habit of reducing it with additional cod-liver oil. For all these purposes, I generally keep on my treatment table three strengths of brown ointment, the strong, undiluted; a weaker, reduced with ten percent of its bulk of cod-liver oil; and a very weak mixture, made with twenty percent of cod-liver oil.

"This salve I almost always use myself as an office application in most forms of chronic blepharitis and blepharoconjunctivitis, and invariably in conjunction with massage..... Most cases of simple hypertrophy of the lid tissues and chronic blepharitis begin to improve after the daily use of this agent for a week or two."

Additional instructions are also given by Dr. Wood for the treatment of follicular conjunctivitis with brown ointment.

I occasionally dilute this preparation further with lanolin, as it gives a little more consistency to the remedy, which is otherwise of a decided liquid tendency. To obtain still greater firmness, my druggist added a very small quantity of paraffin, which apparently had no deleterious effect and was nonirritating. But this latter combination I never prescribe for the patient to use at home.

1130 Spruce street.

CYSTIC DEGENERATION OF CORNEA AND SCLERA

W. A. Huber, M.D.
TULSA, OKLAHOMA

This case was presented before the Tulsa Academy of Ophthalmology and Otolaryngology in November, 1929. J. Y., Okmulgee, Oklahoma, thirteen years of age, white male, was brought to me October 18, 1929. He seemed apparently in good health. Blood and urine were negative.

He gave a history of something growing on the left eye since three years of age. This growth seemed to be getting larger and sight was gradually failing in this eye. There was no history of injury to the eye.

Right eye vision was 20/20 and looked essentially normal. Left eye vision was 10/200. There was no redness or any sign of irritation in this eye. It showed a very interesting phenomenon. There was a horizontal lobulated cystic tumor formation about ten millimeters long and four millimeters wide at the nine o'clock position, half in sclera and half in cornea. The scleral part only of the tumor formation was lobulated. The temporal end of the growth terminated in the outer part of the pupillary area as a yellow hazy opacity. The opacity was 1.5 millimeters wide, and did not stain with fluorescein. The growth looked like a big blister with quite clear transparent fluid in it.

October twenty-third, under morphine-scopolamin narcosis and cocain, I removed the anterior layer of this growth, which seemed to involve one-half the thickness of sclera and cornea; and fluid drained out. The hazy corneal area was dissected away in the line of cleavage without perforation of the cornea. The exposed area was covered with a conjunctival flap. The pathologist reported cystic degeneration of cornea and sclera.

November eighteenth, vision in this eye was 15/100, which was some improvement.

In looking through textbooks and literature the condition seemed to be quite rare, hence my excuse for reporting the case.

1113 Medical Arts Building.

INTERMITTENT EXOPHTHALMOS OF ONE EYE

SARADINDU SANYAL, M.B.
CALCUTTA, INDIA

A Hindu male, aged twenty-five years, came complaining of periodical protrusion of the right eye, especially when he lay down on the bed or bent his head low for some time. The protrusion subsided of its own accord after some time. During the protrusion he did not feel any discomfort or pain in the right eye, nor was vision interfered with.

When the patient came there was no exophthalmos, but, on being asked to come when the protrusion occurred, he bent down his head, and within a few minutes the exophthalmos occurred. There was no edema of the lids or conjunctiva, nor were the conjunctival, episcleral, or ciliary vessels seemingly congested. The conjunctiva, cornea, and anterior chamber were perfectly normal. The pupil reacted normally. But the tension of the eyeball as registered by the Schiøtz tonometer was 80 mm. Hg. The central vision was good, with slight contraction of the nasal field. The lens and the vitreous humor were perfectly clear. Ophthalmoscopy showed slight engorgement of the veins. The movements of the eyeball were quite normal.

The accessory sinuses seemed to be free from pus, as studied by nasopharyngoscope and by transillumination.

Comment: This case is peculiar in several respects: (1) exophthalmos of an intermittent character; (2) enlargement of the globe in all its diameters; (3) rise of intraocular tension; (4) absence of signs of increased pressure in the eyeball except slight engorgement of the intraocular veins.

This rather peculiar rapid rise and fall of intraocular tension, in the absence of any external manifestations of increased tension, has been reported only in some cases of glaucoma after epidemic dropsy. (See American Journal of Ophthalmology, April, 1928, page 337), but in it there is no exophthalmos and the disease is bilateral. Possibly congenital varix of the orbital veins (Birch-Hirschfeld) and some psychic factor were responsible for the symptoms. Other causes of exophthalmos include ethmoiditis (Weeks) and suppressed menstruation (Teillais).

This case is recorded in view of the great rarity of the disorder, de Schweinitz having seen one in 100,000 cases and finding only sixty cases on record.

17/2 Beadon street.

EARLY FIFTEENTH CENTURY REFERENCE TO AN INTERESTING OCULAR PHENOMENON

AARON BRAV, M.D.
PHILADELPHIA

Joseph Albo, in his "Sepher Haikkarim" or book of principles (volume 11, page 192), referring to the "likeness of the glory of God", compares it with the appearance of the rainbow, not because it is similar to it in appearance, but because the colors seen in the bow are not really such as they seem, the appearance being due to the mixture of different vapors.

"This is proven by the fact that the moisture in the eyes sometimes produces the appearance of a circle in the air with the colors of the rainbow, though of course there are in reality no such colors".

Albo lived in the early part of the fifteenth century and, judging from his many medical references, was probably a physician. I have seen no earlier reference to this ophthalmic phenomenon in my readings, but I judge that it was probably an old observation, since it is quoted in a philosophic treatise. At any rate, it is an interesting observation, described in the fifteenth century, and deserves to be recorded in the American Journal of Ophthalmology.

Albo's book was written in Hebrew, and has recently been translated by Professor Isaac Husik of the University of Pennsylvania, who consulted me on the subject for an explanation.

2027 Spruce street.

SOCIETY PROCEEDINGS

Edited by Dr. Lawrence T. Post

BALTIMORE CITY MEDICAL SOCIETY

Section on Ophthalmology

December 5, 1929

Dr. Leo J. Goldbach, president

Comments on glaucoma in practice

Dr. Lloyd B. Whitham said there was probably no one other ocular abnormality about which scientific opinion was so divided, especially as to etiology and early pathology, as glaucoma. He stressed the part that worry, emotional upset, and distress had in the causation and progress of these cases and mentioned that in proportion to the complexities of life there had been an increase in the incidence of glaucoma, while with the advance of civilization, better therapeutic measures, more modern lighting appliances, and more careful attention to the correction of refractive errors, there had been a decrease in the per capita admission to blind asylums for various other ocular abnormalities.

As a means of diagnosis and observation of the progress of glaucoma, visual field changes held precedence over all other findings, even including an accurate record of the intraocular tension.

Regarding treatment, in addition to the usual measures, careful attention should be given to avoiding of all worries and domestic grievances. As an operative procedure, corneoscleral trephining had no peer when the chronic type of glaucoma was under consideration; just as iridectomy was best in acute cases.

Dr. Whitham had made a slight modification in the original technique of the corneoscleral trephine operation as described and demonstrated by Dr. Elliot during his tour in this country, in that the corneal dissection was carried much further on either side, thus allowing a greater space for the aqueous to filter, and helping to exclude the possibility of the trephine opening filling up and closing. A flap of the bulbar conjunctiva was thrown down and held taut with a cotton-wound applicator, while the cornea was split with a dull instrument for about four millimeters, pushing the dissection on both nasal and temporal aspects as far as the horizontal meridian, where it tapered off to about one millimeter, after which the operation progressed in the usual way.

Discussion. Dr. W. H. Wilmer said that the glaucomatous state was influenced by many conditions, psychic, vasomotor, toxic, and endocrine disturbance. In the treatment of senile glaucoma, all foci of infection should be eliminated and other bodily disturbances corrected as far as possible, while miotics were being freely used. If the intraocular tension remained high, an operation should be performed before there was any permanent impairment of vision.

In the discussion of glaucoma in Amsterdam, Duke-Elder had said that, while surgical treatment was merely palliative, medical treatment could not replace it in the majority of cases. On the other hand, Magitot considered that glaucoma was a "sick eye in a sick body," and that its treatment should be generally medical rather than surgical.

There was a great tendency to overlook chronic glaucoma, particularly in myopia, when central vision was good and intraocular tension not very high. Yet if the visual fields were carefully taken in these cases, it would be found that there was a great loss in the nasal fields.

Dr. Wilmer mentioned the incident of a myopic physician bringing an equally myopic brother for consultation on account of incipient cataract. In this case the vision for distance and reading was quite good; but the intraocular tension was in the right eye 37, and in the left eye 29 mm. (Schiøtz), and the blind area was seriously en-

croaching upon central vision. Somewhat later the doctor presented himself for examination, and a very similar condition was found in his own case. Both were quite shocked to find how far the glaucoma had advanced.

Many of these cases of simple glaucoma, in a fairly high degree of myopia, exhibited impairment of central vision, markedly contracted fields, and pronounced cupping and atrophy of the nerve, with an intraocular tension but little above the assumed normal.

A very nearsighted eye was a sick eye, and such an eye, still further damaged by glaucoma, would not stand even slightly elevated tension. In such cases, where miotics and other medical treatment failed to arrest the disease, the only hope of saving vision lay in reducing the tension much below what was considered normal, by some operative procedure.

Dr. C. A. Clapp did not agree with Dr. Whitham that the field changes were the first and most important indications for an operation. He felt that the tension was first in importance, and if high one should operate before the fields were affected. He felt that normal tension varied greatly in many people.

Dr. Leo J. Goldbach asked if any member had had experience with ergotinine, or with the use of ten percent sodium chloride solution intravenously, subcutaneously, and internally.

Dr. Wilmer replied to this that he had not had success with the use of sodium chloride, and felt that it did not increase the number of patients who got better without operation.

Dr. Jesse W. Downey mentioned a case with myopia that had developed glaucoma in one eye. After operation, the tension was reduced and continued to remain normal. Glaucoma was developing in the other eye and, though the tension was not very high, having regard to Dr. Wilmer's discussion this eye should also be operated on.

Dr. Whitham, in reply to Dr. Goldbach's question regarding the use of sodium chloride, found that this salt interfered too much with the body generally unless given very accurately and slowly.

Some ophthalmological observations as field director of the Rockefeller Foundation.

Dr. Earl L. Burky gave a very interesting account of his work during the last two years as a field director of the Rockefeller Foundation, and presented interesting pictures of various places visited in Labrador and the West Indies and also of rare diseases seen in these places.

He observed in the cold northern countries, where the variety of food was limited and the mode of living restricted, that eye diseases were not more common than in places with more temperate climate and better diet facilities. In tropical countries, where diet was also restricted, eye diseases were as common as in the more civilized centers of population. Xerophthalmia was found to be prevalent among natives of the Virgin Islands.

Angus L. MacLean,
Secretary.

MINNESOTA ACADEMY OF OPHTHALMOLOGY AND OTOLARYNGOLOGY

Section on Ophthalmology

December 13, 1929

Dr. Charles N. Spratt, president

Membranous conjunctivitis

Dr. F. E. Burch showed a case which had been admitted to the hospital a few hours before the meeting. In both eyes the conjunctiva was entirely covered with a thick adherent membrane resembling chamois skin. The child was ten months of age, otherwise healthy, and with no history of previous illness. There was no membrane in the throat, and the attending physician had reported that none had been found on previous examination. The mother had had a sore throat, and both mother and child had been given antitoxin on suspicion, when first seen, but the swabs and cultures were negative. Conjunctival secretion was not profuse.

Both corneas were ulcerated, the right eye over its entire area. The lids were brawny and swollen, but were everted without much difficulty. The case was not unlike those described by Rutherford in a paper on membranous conjunctivitis at the last meeting of the American Medical Association. Smears from the conjunctiva in the baby's case showed no diphtheria bacilli, but the presence of large diplococci, resembling pneumococci.

Discussion. Dr. J. F. Fulton stated that the case presented by Dr. Burch tonight brought back to his mind a very bitter experience in Saint Paul many years ago in a case of diphtheric conjunctivitis that was not recognized. He said that he had seen a number of cases of this disease with other doctors and was on his guard, but once when he was out of the city a case taken to his office was therefore sent to another oculist who, although one of much experience, failed to recognize the disease and sent the patient to one of our largest hospitals with most unfortunate results. A number of patients and other inmates of the institution were attacked by the disease, with most serious consequences. In fact, it became necessary to close the hospital for a time in order to get rid of the infection. Dr. Fulton stated that diphtheric conjunctivitis was not very common in this country but was met with quite frequently in certain parts of Germany and England.

Dr. Burch said that the question might have been raised as to whether this child had a diphtheric conjunctivitis, and whether or not antitoxin administration had influenced the last bacteriologic findings, which showed pneumococci; also, after administration of antitoxin, why should there now be these membranes? Dr. Burch did not believe this was a case of diphtheric conjunctivitis, but rather one of those types that sometimes occurred with severe streptococcic infection.

Congenital lamellar cataract with optical iridectomy

Dr. F. E. Burch showed a baby of eight months with dense lamellar cataracts in which optical iridectomy was done. The iridectomies were made on the temporal side, with preservation of the sphincter, after the manner described by Hess. Dr. Burch had now operated upon nine young patients with central lens opacity, and preferred iridectomy on the temperal side, slightly below the horizontal meridian, believing this afforded some advantage because of the increased lateral field of vision. In two of the nine cases the sphincter was not preserved; in one of these, a boy of six years, it was necessary to do a subsequent needling, as vision through the insufficiently transparent periphery of the lens which remained was not sufficiently improved. In two cases also the optical iridectomy had been done downward. Dr. Burch advocated early operation for dense lamellar cataract patients in whom the lens periphery could be utilized, as he believed it lessened amblyopia and tendency to nystagmus. The little patient shown was the youngest in his series.

Epithelioma of globe and skin

Dr. Laura A. Lane presented a patient to show the effects of radium during a very short period of time—less than seven weeks. The patient was seventy years of age and for twenty-five years had had a growth at the outer canthus of the right eye. Five years ago she struck the growth and a rapid increase and breaking down of the same followed. She had had considerable pain and discomfort as well as bleeding and mucopurulent secretion. The family history in this case showed that the mother had died of a uterine carcinoma and the father of a carcinoma of the stomach.

The patient was admitted to the University Hospital October 14, 1929, with extensive involvement of the bulbar and palpebral conjunctiva and of the skin and other tissue about the outer canthus of the upper and lower right eyelids. The natural color photograph shown gave a good idea of the extent of the lesion. The patient also had senile cataracts.

The lesion was radiated on October 23rd, with 395 mg. hours of radium element. She returned today with the lesion healed, with no evidence of inflammatory reaction of the globe itself and no advancement of the cataract, but rather with slight improvement in the vision.

As a prophylactic she would be given another fairly heavy radiation next day.

Sarcoma of the choroid

DR. CHARLES N. SPRATT reported the case of Miss B. L., aged forty years, who said she had been struck on the side of the head by an automobile one year ago and thought that her vision had been failing in the right eye since that time. The examination showed 5/12 vision in the right eye. There was a whitish uniformly raised area extending on the nasal side of the retina five to thirty degrees, and ten degrees above the horizontal line and fifteen degrees below. The surface was smooth and could be seen with a plus 9.00 or 10.00 sphere. The tension was normal, a Wassermann was negative, and there was no sign of redness or irritation. A provisional diagnosis of sarcoma of the choroid had been made.

Tuberculosis of the cornea

DR. WALTER E. CAMP reported the case of a married woman, aged sixty years, who had first been seen three years ago. Her complaint at that time was impaired vision in both eyes, worse in the right eye, with redness and slight dull pain in the left eye. The duration of the present attack in the left eye was two weeks.

She stated that she first began to have trouble with the eyes in 1911, sixteen years previous to the time Dr. Camp first saw her. At that time the left eye became red, the vision was blurred, and there was the same dull pain. About 1920 the same condition developed in the right eye. She had then consulted Dr. Murray, who diagnosed the case as tuberculous keratitis, and gave her Koch's O.T. Following the initial dose of O.T. the right eye became very much worse, and the vision markedly more impaired. It had remained so ever since.

About the time Dr. Camp first saw her the left eye showed some new exudates (yellow) deep in the cornea. The right eye was quiet. Vision O.D. was less than 1/60; O.S. 2/60 with glasses.

She was again given a course of Koch's O.T., and after one month the exacerbation in the left eye had subsided and the vision was 6/30. She was also using atropin and dionin. She developed an atropin dermatitis and it was necessary to use scopolamin. Acute exacerbations had recurred at intervals of six months to a year, the last one being in the right eye. The vision now was 1/60 in each eye. The case showed marked interstitial exudates with some calcification deep in the cornea. The iris reactions were feeble; the media were not seen clearly.

Possible tubercle of the macula

DR. CAMP also reported the case of a young woman about thirty-four years of age. She was first seen in March, 1925, complaining of impaired vision in the left eye. Present symptoms began about ten days ago. Examination disclosed several (about five) small white spots of exudate in and immediately around the macula. These spots were about one-fourth to one-third of a disc diameter, and were white, without pigmentation. The vision at this time was 20/25. Edema of the retina and choroid developed. The vision gradually was reduced so that seven weeks later it was 0.5/60.

Examination then showed a kidney-shaped, slate-blue area in the macula, with folds in the retina surrounding it. The general examination was negative; the Wassermann was negative; but there was a markedly positive tuberculin test. The areola was two centimeters in diameter, and there was an indurated area ten centimeters around the areola. The markedly increased eye pathology followed the tuberculin test, and should be considered a focal reaction. The eye pathology progressed

for the next two weeks, then healing and recession began and there had been no change during the past three years. Now the macula showed a large bluish-white, entirely quiet mass of exudation about two disc diopters in diameter, surrounded by some new blood vessels.

The past history of this patient was instructive, as in her childhood her home physician in Buffalo had made a diagnosis of tuberculous cervical adenitis. Later, in 1916, a tentative diagnosis of incipient pulmonary tuberculosis was made.

Discussion. Dr. F. E. Burch said that, following the pioneer work of Dr. Boeckmann of Saint Paul, he had become very enthusiastic about tuberculin, but was now almost done with using tuberculin except for diagnostic purposes. He would not use it in Dr. Camp's second fundus case. In scleritis cases such as this, there was one form of therapy which was not universally recognized, and that was the therapeutic use of x-rays. In a large number of cases with anterior quadrant tuberculosis involving the ciliary body, and with a certain amount of scleritis, radium or x-ray therapy should be employed very much more than it was. Dr. Grant had been carrying out a considerable amount of x-ray treatment with this type of case, with very beneficial results. On one case of brawny scleritis, after putting the eye at rest with atropin, and after local applications had accomplished almost nothing, it was marvelous how the scleritis cleared up under x-ray treatment. Dr. Burch could not give exact dosage, this he left to the roentgenologist, but there was no doubt about the stimulating action of proper dosage with x-ray and radium. Dr. Laura Lane had reported the good results of radium treatment and Dr. Burch complimented her for this very excellent work; in the hands of one who understood the dosage and the reactions of x-ray and radium, this form of treatment was very much worth while.

Dr. Spratt said that it might be interesting to know that Verhoeff, the man who many years ago had shown the relationship between tuberculosis and scleritis, some four years ago had stated that he had stopped the use of tuberculin in this type of case. In regard to the use of x-ray and radium, Dr. Spratt felt that, if one understood this and knew just what he was doing, it was all right.

Dr. Fulton did not think it just to condemn so valuable a remedy as tuberculin because an oculist now and then did not have a satisfactory result in using it as a therapeutic agent in the relief of ocular tuberculosis. Such disappointments were usually due to the use of the remedy in cases not well selected, or complicated by other troubles, or to failure to have patients use the remedy a sufficient length of time. He agreed absolutely with the teaching of Dr. W. C. Finnoff and a host of others in saying that it was a remedy of great value, and that those who failed to use it would lose eyes that could be saved and would fail to relieve suffering in many others. The remedy really needed no defense.

Traumatic mydriasis

Dr. John A. Pratt presented the case of a patient, Mr. H., aged twenty-eight years, who on October 14, 1929, complained of a dilatation of the left pupil. He said that three weeks prior to this date he had been hit in the left eye by a piece of steel, which he said penetrated the upper lid. At that time there was ecchymosis of the nasal side of the conjunctiva. He was attended by a general physician, with a seemingly complete recovery. Three weeks after the accident his pupil dilated.

Examination showed nearly complete dilatation of the left pupil, vision 20/20, accommodation good. There was slight redness at the corneoscleral junction at about nine o'clock. Examination of the media and fundus was negative. Transillumination of the sinuses was negative. The Wassermann test was negative.

An x-ray of the eye showed two foreign bodies, one in the orbit and the other in the globe at about the nine

o'clock position, just back of or partly in the ciliary body.

Under atropin, complete dilatation of the iris took place, and by displacement of the eye nasalward the end of the foreign body could be seen. The vision was becoming poorer and, on the advice of a consultant, the steel was removed through a cut in the sclera, just below the internal rectus and back of the ciliary body. There was no trauma in the removal. The steel was six millimeters long and one-half millimeter wide.

DR. PRATT stated that the point of interest in this case was the traumatic mydriasis due to a small injury. The greater dilatation under atropin and the contraction under eserin showed that the muscles of the iris were normal, so the trouble must be in ciliary disturbance of the motor oculi.

The vision on December 13, 1929, was 20/30, with a plus 0.25 sphere 20/25; requiring plus 1.50 sphere for reading of Snellen's finest type.

Glaucoma operation (filtration)

DR. H. W. GRANT reported the case of Mrs. G. G., aged seventy-one years. The patient was operated on by Lundsgaard's modification of the Borthen operation. In this operation the conjunctival flap was elevated from above downward to the cornea. This flap should be begun as near the upper fornix as possible and should include all of the episcleral tissue that could be obtained. An incision was then made in the sclera with Lundsgaard's knife, about two millimeters from the limbus, so that the anterior chamber could be entered with forceps. The iris was then grasped with forceps near the pupillary margin and pulled straight out. A meridional incision with scissors was made, beginning at the sphincter margin and running straight down to the ciliary body. The margins of the iris were now grasped with forceps and pulled laterally and upward on to the sclera. The conjunctival flap was then replaced. This operation apparently produced an excellent filtration of the aqueous from the anterior chamber. Operations performed a year or more ago still showed good filtration with normal tension. Tension taken on this patient yesterday (December 12th) showed: right eye, 15, left eye, 38 mm.

Luxated lens

DR. FRED J. PRATT reported the case of Mr. G. A., aged thirty-four years, who had come on October 7, 1929, for glasses. His refraction in the left eye was +5.00 sphere +1.50 cyl. ax. 75°, giving vision 20/40. The lens was dislocated downward, the upper edge of it showing in the upper edge of the pupil. The eye was dilated with homatropin and a clear lens was seen in the lower part of the eye. About a month and a half later the patient returned with sudden loss of vision and the eye somewhat painful. The lens was in the anterior chamber and he was advised to have it removed. Two days later it was removed, and at this time the eye was very red, edematous and painful. A conjunctival flap was turned down above and a suture placed; a small incision was made with the knife and enlarged with scissors. The Smith spatula was inserted and the lens removed on the spoon. A fairly large bead of vitreous presented but returned to the eye when the flap was tied, with no loss. No iridectomy was performed.

Considerable reaction followed the operation and the eye was still red at the time of this report. The pupil remained dilated in spite of the use of eserin, probably due to the vitreous in the pupillary area. The media were still cloudy but were clearing.

Four years ago a foreign body flew into the right eye, followed by an ulceration for which the patient was treated in a hospital. He now had a large scar in the lower half of the cornea, and an anterior staphyloma. The lens was removed at that time. There was no vision.

In checking the history the patient said that he had always been nearsighted, but never had had his eyes examined until the time of his injury four years ago. He had never had any other injury to his eyes.

Discussion. DR. H. J. ROTHSCHILD stated that he had seen this patient about five or six years ago. At that time there was a dislocation of both lenses, one upward and one upward and inward. This was undoubtedly a case of ectopia lentis and, in these cases of congenital orgin, it was common for the condition to attack both eyes. At that time the speaker had operated on the right eye, in which the lens had recently been dislocated into the anterior chamber. The other eye was the one that Dr. Pratt had demonstrated this evening.

W. E. CAMP, Reporter.

NEW ENGLAND OPHTHALMOLOGICAL SOCIETY

December 17, 1929

DR. W. HOLBROOK LOWELL presiding

Unusual visual field in tabes

DR. T. L. TERRY presented a woman whose chief compaint was that her pupils did not react to light. Some lady friend had observed this and called it to her attention. She had Argyll Robertson pupils, locomotor ataxia, absent knee jerks, and positive Romberg. Vision was, right eye, 20/50; left eye, 20/200. The discs showed abnormal pallor. The fields showed bitemporal defects not extending past thirty degrees. The scotoma in the left eye involved the center of fixation. The right eye had a central scotoma two degrees in size but separate from the incomplete temporal scotoma. In the left eye the temporal field was cut down to sixty degrees.

Fuchs, in his paper on "The field of vision in tabetic atrophy of optic discs," published in Transactions of the American Ophthalmological Society in 1911, called attention to fields of vision in tabes in which central and bitemporal scotomata occurred. These, of course, had been observed before, but Fuchs thought central scotomata occurred more frequently than in two percent of the cases as Uhthoff had previously claimed. Fuchs further did not think the central scotoma was always due to a simultaneous bilateral syphilitic retrobulbar neuritis. He stated that the fields often became contracted with formation of central scotomata. The central scotomata often foreshadowed bitemporal hemianopia. Tabes caused pale discs from the onset in contrast to toxic amblyopia. However, he did not deny that syphilitic retrobulbar neuritis could occur. He had seen only six syphilitic bitemporal hemianopia cases in his vast experience. He considered such field changes due to syphilitic inflammation at the chiasm.

Myelogenous leukemia with unilateral exophthalmos

DR. T. L. TERRY presented a woman who had exophthalmos of the left eye, first noticed one week after an automobile accident. This accident had not caused any detectable injury. X-ray showed no orbital injury or tumor. The exophthalmos gradually increased over a period of one month. The patient went first to a private clinic for study. No cause for exophthalmos was found. The blood and basal metabolism were normal. At Dr. Terry's first examination he found one diopter of papilledema in the left eye, with retinal hemorrhages and dilated retinal veins in each eye. The exophthalmometer readings were: right eye 16 mm., left eye 27 mm. There was limitation of motion of the left eye upward, outward, and slightly inward. There was some exposure keratitis. Because of bilateral retinal hemorrhages, some systemic disturbance such as leukemia was suspected. The sinuses were negative, spleen and lymph nodes were not enlarged, but the tonsils showed considerable hyperplasia. Another blood count at the suggestion of Dr. F. H. Verhoeff showed 23,800 white blood cells and hemoglobin seventy-five percent and smear showed a considerable number of large abnormal monocular leukocytes. Goodpasture's oxidase stain proved these to be myelocytes. Evidently the smear examined elsewhere one week previously was during an aleukemic phase of the disease. A complete count the following day

showed red blood cells 3,910,000, hemoglobin sixty percent and white blood cells 18,600, sixty percent of these being myelocytes.

The patient was admitted to the Massachusetts Eye and Ear Infirmary, and a full therapeutic dose of x-ray was given to the left orbit. Six days later a second x-ray treatment was given to the left orbit. The exophthalmos abated rapidly, and in one week after the second dose it had completely disappeared and the left eye had normal motility. X-ray treatments of spleen and long bones were given, but the anemia progressively increased, and the white count increased to 40,400 cells. New hemorrhages appeared in both retinæ, and some of the old hemorrhages showed white spots in their centers, giving the characteristic picture of leukemic hemorrhagic retinitis. The patient was discharged with complete recovery from the exophthalmos, but the leukemia, of course, continued in increasing severity. Her family physician later reported enlargement of the spleen and hemorrhages from the gastrointestinal tract. The patient died four months after the diagnosis was established.

Injury of optic nerve with fencing foil

For Dr. F. H. Verhoeff, Dr. T. L. Terry showed a patient who had suffered a penetrating wound of the left upper eyelid on the nasal side. At examination the eye itself was found uninjured. Vision was 20/100 plus. The field of vision was destroyed except in the upper nasal quadrant. The left pupil gave normal consensual light reaction but none directly. After two weeks the visual field remained the same but the vision improved to 20/30 plus. The pupillary response to light was normal. Muscle test showed right hypotropia of eight degrees, and exotropia of eight degrees. With the correcting prisms the patient had binocular fixation.

Evidently the foil injured the optic nerve near the apex of the orbit. The superior and internal recti muscles were also injured, but the superior oblique escaped. There remained a slight extorsion of the left eye due to the internal rectus injury, and slight compensatory overaction of the inferior oblique. The pupillary fibers in the optic nerve were evidently disturbed sufficiently to cause the temporary absence of pupillary response to light. This seemed unusual because these fibers were coarser and commonly more resistant than the other fibers of the optic nerve.

Cure of retrobulbar neuritis of luetic origin by forced spinal fluid drainage

Dr. E. B. Dunphy showed a woman thirty-one years old, who had come to the clinic complaining of blindness of the left eye. Fundus examination showed a receding papillitis with elevation of one or two diopters and secondary atrophy. The patient had discovered poor vision only a few days previously. Skull plates were normal. X-rays of sinuses and teeth were negative. Blood was taken for the Hinton test. The right eye had normal vision and normal fields. Two days later the patient returned complaining of rapidly decreasing vision in the right eye. Fundus examination was negative. Vision was counting fingers at three feet and there was fairly good light field. The patient was taken into the hospital and forced spinal fluid drainage was performed that day. Fluid was forced by mouth, 65 c.c. of distilled water given intravenously, and an ampoule of pituitrin injected. One hundred and fifty c.c. of spinal fluid was collected over a three-hour period. During this process, vision improved in the right eye and at the end of the drainage it was 20/20 with normal fields. Dynamics of the spinal fluid were normal. The pressure was not increased; there were 38 cells. Wassermann on the spinal fluid was strongly positive. Blood Hinton was reported strongly positive. The spinal fluid drainage had no effect on the left eye, of course, as atrophy had already set in. The patient evidently had a low grade syphilitic meningitis. The optic canals were

very small in the x-ray, measuring only four millimeters in diameter. Perhaps this smallness of the optic canals contributed to the atrophy of the left eye.

Discussion. Dr. G. S. Derby stated that the method of treatment was apparently successful in cases of tryparsamide, but he wished to call attention to the fact that two of the cases of acute retrobulbar neuritis of unknown origin were treated without success.

Dr. E. B. Dunphy stated that we knew that in draining of the spinal fluid the last five cubic centimeters of fluid collected contained more cells than the first five cubic centimeters. By forcing the flow of spinal fluid it was felt that a new type of spinal fluid was secreted. Kubie of Baltimore, working on cats, had shown by actual photographs of tissue that after forced spinal fluid drainage lymphocytes in the perivascular spaces were extruded into the subarachnoid space. Therefore it might not be unreasonable to assume that, if lymphocytes could actually be washed out of the tissue into the spinal fluid by this method, toxins also could be eliminated.

Cerebral localization with reference to the eye

Dr. Edward W. Taylor said cerebral localization had actually begun with the phrenologists Gall and Spurzheim, who attempted to deduce certain mental faculties from the general shape and particular irregularities of the skull. Their work, which was quickly discredited, at least drew attention to the possibility of localization, although it no doubt also discouraged more scientific attempts. In 1870, during the Franco-Prussian war, Hitzig made the important observation that stimulation of the Rolandic area led to spasmodic contraction of the extremities of the opposite side. From this time on, work in localization of an experimental sort became very active and was carried to extremes. The pendulum had since swung back, and sharp localization of specific functions was regarded with much less favor now than during the latter years of the last century. Regarding the visual system much was known. Inasmuch as the retina gave rise to fibers as well as receiving the endings of others, it might be regarded as itself a modified cortex. There were possibilities of localization in various parts of the visual tract from the retina to the occipital lobes, especially in so-called primary optic centers, namely, the external geniculate bodies, the pulvinar of the thalamus, and the anterior corpora quadrigemina. In man, by all means the most important of these were the lateral geniculate bodies from which in great measure arose the occipital radiations. Accurate diagnosis of visual fields in the occipital cortex was difficult, although it was very definitely known that the cortex along the calcarine fissure was the main cortical center for sight. Orton had recently attempted to show on an anatomical basis why in certain children reading was particularly difficult. He distinguished three cortical levels which he called respectively visual perceptive, visual recognitive, and visual associative. Lesions in the visual pathway produced combined homonymous hemianopsia and so-called visual aphasia. Word blindness and mind blindness also had relation to this subject.

S. J. Beach, Secretary

COLLEGE OF PHYSICIANS OF PHILADELPHIA

Section on Ophthalmology

December 19, 1929

Dr. C. E. G. Shannon presiding

Massive retinal exudation.

Dr. Burton Chance reported further on the case of the little boy exhibited at the November meeting, which had been regarded as one of glioma. The eye was enucleated a few days after the meeting. The mass had increased so extensively that it was almost impossible to find any ordinary reflex when the ophthalmoscopic examination was made. Dr. De Long and he were still struggling to find something more definite; yet up to this afternoon noth-

ing but exudative products had been found in the sections. They were therefore forced to state that it was not a case of glioma.

Pagenstecher's sutures for ptosis

DR. CHANCE brought this young man to show to the Section because he thought that all might be interested to see the effects of so simple a procedure as that of buried suturing. When he was first consulted the right upper lid covered the eye and could not be elevated, but now the man was quite able to open the fissure to the full width. The sutures were made of rather thick, heavy, rough silk, and a short, broad needle curved on the flat was used so that in the cicatrization which followed the tract was quite wide. The sutures came out one after another on being tightened day by day. The tracks thus made were cicatrizing and contracting, so that there was a fairly wide fissure which it was hoped might be permanently maintained. What would be required later was problematical, yet at present the result was quite satisfactory and therefore perhaps nothing else would be required.

Uveitis with secondary cataract

DR. MARY BUCHANAN brought a little boy in whose left pupil something white had been noticed about eight months previously. There was no history of injury and the eye did not seem to bother him at all. The pupil did not dilate and appeared to be bound down. The boy could not count fingers, but next day, after atropine solution was used, he counted fingers at eight inches. Light projection was very poor. There were calcareous deposits in the lens, which was cataractous. There was no view of the fundus. Transillumination was tried but was unsatisfactory, as the boy began to cry.

DR. BUCHANAN wished to know whether there was any immediate danger from retaining this eye, and if there was a possibility of the condition being due to a new growth.

Discussion. DR. REESE said he believed that he had seen this boy before, and he was interested particularly in the corneal condition, which he thought was a zonular keratitis. He considered this rare in such a young individual although he had seen a similar case.

DR. CHANCE stated that if the disease of this eye was not dependent upon the retention in it of a foreign body, the present appearance reminded him of certain cases of metastatic deposits he had seen in the course of acute infectious diseases, in which there were signs of uveitis of progressive severity.

DR. ZENTMAYER said, in connection with Dr . Reese's observation, that he had recently seen in consultation with Dr. Heed a girl aged six years with bilateral uveitis in which both eyes showed a beginning zonular opacity of the cornea. In one eye vision was light perception and in the other it was nearly normal.

DR. SHUMWAY asked if an x-ray of the eye had ever been taken, and he reminded the Section of a case of Dr. John Carpenter, in which an eye had been removed for panophthalmitis supposedly due to an attack of mumps. Microscopical examination later, however, showed the presence of a piece of steel which had flown into the eye as the boy was standing beside a blacksmith's anvil.

DR. BUCHANAN, in closing, said that the possibility of a foreign body had been considered at first, on account of the position of the two linear corneal opacities concentric with the limbus, but the x-ray was negative.

The only history was that the child had had tonsillectomy at four years of age and had been well since. There had been no recent illness. The maternal grandmother had tuberculosis.

Case exhibiting active circulation in the posterior part of the lens

DR. CHARLES A. YOUNG (by invitation) showed a white man aged seventeen years, who had been first seen October 15, 1929, complaining of pain in the left eye. Examination showed the following: Vision without glasses O.D. 6/4, O.S. 6/7.5 plus 1. Binocular vision was normal. Cycloplegia re-

vealed hyperopia in each eye. With a plus 0.75 sphere over the right eye vision of 6/4 plus was obtained, and with a plus 1.25 sphere over the left eye vision of 6/6 plus 2. Near point, using 0.50 meter type without glasses, for O.D. equalled 9 c.m., and for O.S. equalled 10 c.m. Muscle balance was negative except for 12 degrees of exophoria at 33 c.m. The left eye showed a small pterygium on the nasal side. Pupillary reactions and tension were normal in each eye.

Ophthalmoscopic examination O.D. was negative, but O.S. showed an opaque plaque slightly nasal to the anteroposterior axis of the lens from which extended a persistent hyaloid artery which looked black with the ophthalmoscope. Upon rotating the eye upward and downward, the middle portion of the hyaloid artery swung with the motion of the eye, but was fixed at both its anterior and its posterior extremities.

Drs. de Schweinitz and Zentmayer were both of the opinion that the hyaloid artery was attached to the inferior nasal branch of the central artery of the retina.

Examination with the corneal microscope showed an opaque plaque in which there were three capillary loops which showed active circulation and were branches of the hyaloid artery. The hyaloid artery had the appearance of a white band when the light was concentrated on the artery, but with the light to one side gave the red appearance of a blood vessel.

Discussion. Dr. de Schweinitz said that he had examined Dr. Young's patient wth the slit-lamp, and found the conditions described by the essayist—an unusual and highly interesting picture. He had been unable to find in Vogt's or Meesmann's Atlas a plate of a similar condition.

Dr. Zentmayer said that as seen with the ophthalmoscope there were opaque lines radiating from the base of the attachment of the hyaloid artery to the posterior capsule of the lens. These were not the blood-bearing vessels seen with the biomicroscope but might be either folds in the capsule or empty vessels. The vessels seen with biomicroscope were probably remains of the posterior vascular capsule of the lens.

Unilateral buphthalmos

Dr. T. B. Holloway and Dr. A. G. Fewell presented a case of buphthalmos in a colored female child. The patient, who was then five months old, was first seen in the eye clinic of the University Hospital in August 1929. The mother had noticed, the day previously, that something was wrong with the child's left eye. The child had never been ill, and had developed normally. There were two other children who were normal in every way. Neither the mother nor the father had ever had ocular trouble.

When first seen in the clinic the right eye appeared normal. The cornea was clear and measured 12.5 mm. The anterior chamber was of normal depth. The pupil was four millimeters and active to light. Finger tension was normal. The left cornea was quite cloudy over its whole surface and measured 14 mm. The anterior chamber was deep, the pupil seemed dilated and very sluggish to light. Finger tension was plus. A mixture of one percent pilocarpin and one fourth percent eserine was ordered to be used in the eye four times daily. When seen two days later the cornea was clear and it had remained so until the present time under the drops.

Dr. Holloway said he thought this case would be of interest, as it seemed to him that it was unusual to see a case of buphthalmos at so early a date. It was the youngest patient of this type that he had seen. While the case had been described as a unilateral one, it was believed that symptoms were beginning to develop in the other eye.

Dr. Holloway said he had first seen the case a month previously, and at that time there were subacute signs, which had cleared up after the administration of suitable miotics. The child was again brought in within the past few days, with a haze in the cornea, and the question came up as to what should

be done for the tension. Practically all types of operative procedures appropriate for glaucoma had been resorted to for this condition, and, to the best of Dr. Holloway's knowledge, with little success. He stated that at the Overbrook School for the Blind were certain students who had been operated on unsuccessfully. At this institution there was quite a group of students with buphthalmos manifesting all of the phases seen in the advanced stages. Not infrequently cases were seen in which the tension was plus in one eye and minus in the other, and the eye was becoming atrophic.

Discussion. Dr. de Schweinitz said that, although buphthalmos was usually described as a bilateral affection, certainly in its earlier stages it was not uncommonly unilateral; witness T. R. Aynsley's recent interesting communication (British Journal of Ophthalmology, December 1929) on buphthalmos and nevus, where ten cases of unilateral buphthalmos were listed, six of the right eye, four of the left eye. All of these patients were mentally defective, and gave evidence of cerebral lesion, usually calcified meningeal nevus.

Dr. de Schweinitz referred briefly to two girl twins, normal in all respects until the age of six and one-half months, when, after a short ill-defined illness, left buphthalmos began to develop, in the form of an enlargement of the globe, very hazy corneas, and increased intraocular tension, which yielded temporarily to miotic treatment. The examinations were made some months ago, and he had received no information as to the present condition of these children.

Referring to the operative treatment, Dr. de Schweinitz stated that his best operative results, at least temporarily, had followed repeated posterior sclerotomies as advocated by Haab, and this had been, he believed, the experience of his associate, Dr. Baer. He doubted the value of iridectomy; he had seen two satisfactory results from corneoscleral trephining, the operations having been performed by colleagues, but he did not know whether these results had been permanent.

Dr. Zentmayer said that some years ago in preparing a paper on buphthalmos he had sent out a questionnaire to most of the prominent eye surgeons in the country as regards the proper procedure in the treatment of this condition.

One surgeon with a large experience in Philadelphia stated that the only operation was enucleation. Dr. Weeks advocated trephining, which was then a comparatively new operation. Dr. de Schweinitz suggested the procedure of Haab, of repeated posterior sclerotomy. Gifford subsequently did a number of trephining operations with unsatisfactory results. His explanation of the reason one did not get filtration in these cases was that the conjunctiva was held close to the sclera because of the distention of the globe.

Dr. Zentmayer said that his own experience had been very unfavorable with operation. He recalled the case of a little child, an infant, who had very marked buphthalmos, on whom he did an iridectomy. Most of the contents of the eye were expelled through the incision in the globe. Dr. Posey attempted cyclodialysis upon the other eye of the patient but failed.

Dr. Zentmayer referred to a case which Dr. Peter had shown before the Section a few years ago, in which he had done an iridectomy with very successful result in a beginning buphthalmos.

Dr. Zentmayer felt that repeated posterior sclerotomy was the only safe operative procedure, but the results were not satisfactory.

Dr. Baer said that he agreed with Dr. de Schweinitz with reference to posterior sclerotomy being the best operative treatment in these cases, but his own feeling was that this only delayed the inevitable.

Dr. Chance recalled the case of a little colored child just two years old who had been under observation in his ward two years ago. He did a sclerotomy upon her with very satisfactory results.

The child had been away from the hospital for many months, but had returned that day, and he was greatly distressed to see that a great change had taken place, and to note that the eye looked very much like that gleaming gem, called cat's eye. The corneas were very edematous and the general discoloration of the sclera ringlike. He was very much disappointed because the immediate result had been so good.

DR. HOLLOWAY, in closing, said that if the present treatment did not give satisfactory results posterior sclerotomy would probably be resorted to.

He said that some might remember that Dr. Gifford reported the history of a case in which the sclera was trephined and a posterior sclerotomy was performed through the trephine opening. About six months before that case was recorded, a patient was sent to the University Hospital on the service of Dr. de Schweinitz. The chamber was so shallow that it was absolutely impossible to get any kind of instrument into it. Trephining of the sclera was done and a puncture made through the opening, hoping to get some deepening of the anterior chamber. At the end of forty-eight hours the tension was as high as before operation.

DR. HOLLOWAY said that of all operative procedures he thought posterior sclerotomy probably offered the most, chiefly because it could be readily repeated.

Operative treatment of pulsating exophthalmos

Dr. G. M. Dorrance (by invitation) read a paper on a new operative procedure for the treatment of pulsating exophthalmos, which was devised because of the failure to cure cases by ligation of the common carotid alone, and because of the danger of hemiplegia occurring where ligation of the internal carotid was practised. (This paper will be published in the American Journal of Ophthalmology.)

The following operation was advocated: Under local anesthesia the common carotid was ligated. Ten to fourteen days later the following branches of the external were ligated, either one or more at the second sitting, dependent on the amount of arteriosclerosis present: the superior thyroid, the lingual, the facial, the ascending pharyngeal, and the occipital.

In the case shown an excellent result had been obtained.

Discussion. DR. HOLLOWAY stated that Dr. Dorrance had been good enough to permit him to see this patient some weeks ago. He felt that all were familiar with the various combinations that had been resorted to in the ligation operations, and that slow ligation was a distinct advance.

Dr. Holloway said that, while it was true that the superior thyroid had been ligated in conjunction with the carotid, he knew of no instances where the various branches had been so treated, and where the possibilities for such splendid control had been demonstrated. He said he thought Dr. Dorrance was to be congratulated on his ingenious technique and his excellent result.

Dr. Holloway had never felt satisfied that the statistics concerning cerebral complications following carotid ligation were reliable, and this was one of the reasons why he had never been in accord with those who had been so apprehensive about the orbital operation. Further, those same individuals had no hesitation about exenteration of the orbit, where these same structures were severed at the very apex of the orbit and much closer to the cavernous sinus than would be the case where ligation was resorted to.

Do corneal scars move? A preliminary report of a clinical and biochemical study.

Dr. Ben Witt Key (by invitation) described the character of the corneal scar which might shift its position in corneal substance. This was the newly formed scar or one recently cicatrized, of the slanting cut variety or irregular laceration type (so-called linear scar), located in the superficial or deep substance of the cornea and involving the

pupillary area just below the horizontal median line. Cases were cited indicating a shifting of the scar's position downward and toward the limbus after a period of one to four years. Measurements as to the size and location of the scar in order to avoid errors in observation were noted in detail in the attempt to determine definitely the corneal change. The extent of this change was admitted to be very limited, not more than 1.5 to 2 mm., but when viewed in comparison with its area of location (the lower half of the pupillary area) it represented a change of some significance.

A brief of the more recent studies of wound healing and regeneration of the cornea, the formation of a corneal cicatrix, and the interpretation of these cellular changes was presented. An analysis of the physical and chemical influence which might explain the shifting of a scar's position was offered. It was suggested that the anatomic structure of the cornea with its biochemic activity (demonstrated under the microscope and by experiment), its migratory cellular content, and its fluid composition (about 90 percent of its volume is water) might permit this change to occur in time through fibrous contraction, tissue tension, pressure of the lids, and possibly functional stimulus induced by adjoining structures or by the action of sunlight.

Subconjunctival injection of Pregl's solution in the treatment of gonorrheal ophthalmia

Dr. Alfred Cowan and (by invitation) Dr. Searle H. Lanyon reported a series of six cases of gonorrheal ophthalmia in adults treated by subconjunctival injections of Pregl's solution. Fifteen minims of the solution were injected under the highest point of the chemotic bulbar conjunctiva, every day as long as the laboratory report showed the presence of gonococci.

The duration of the infection for the six cases treated was respectively 13, 6, 5, 3, 7, and 5 days, an average of 6.5 days. Case 5, given as of seven days duration, was practically free of organisms in three days, only a few gonococci having been seen on the sixth and seventh days. In only one of the eyes was useful vision lost. This was in a man seventy-three years of age, whose cornea was already nearly opaque on admission. In four of the cases the vision was unaffected, and in one the vision was 6/12.

One other feature should be considered in this series; in no instance was more than one eye involved. This, of course, must be credited to good nursing and careful prophylaxis. Whether or not the treatment had any bearing on this could not be said.

A. G. Fewell, Secretary

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CAUSES OF GLAUCOMA

The common explanations of the etiology of glaucoma are not satisfactory. They are too strictly mechanical, too much based on the conditions found after glaucoma has run its course and ended in destructive changes. They deal with late results of disease, rather than its special and immediate causes. Dilated pupil and blocking of the angle of the anterior chamber are known to occur in glaucoma, but are often late effects of pathologic processes rather than the causes of the earlier increase of intraocular tension.

Complete closure of the drainage channels of the eye would cause increased intraocular pressure; for continued intraocular nutrition requires that fresh fluid continue to enter the eyeball. But is the outflow through Fontana's space and the canal of Schlemm the only important part of ocular drainage? May not the escape of fluid through this space be a provision for meeting excessive secretion and transudation? This drainage channel may act like the spillway of a dam, or the storm sewer of a city, to carry off floods that arise occasionally and would do great damage if some channel of escape were not provided for them. But the choking of such a channel cannot be regarded as the cause of a flood, and the normal flow of fluid through the eye may depend on a quite different mechanism, which can be compared with the normal flow in the bed of a stream, or the usual drainage through the sanitary sewers of a city.

To all parts of the body, including the eye, the nutritive supply of blood is carried through the arteries; and the escape of fluid, the return circulation, is chiefly through the veins. But there is a supplementary system of tissue drainage by the lymphatics. The anterior and posterior chambers, the interstices of the vitreous, Fontana's space, and the canal of Schlemm are

lymphatic spaces. Like other lymphatic spaces their fluid content ultimately reaches the general circulation through the veins. The canal of Schlemm is a group of large lymph channels emptying directly into veins. This space, as seen by goniometry, sometimes contains blood and at other times pure lymph unmixed with blood. How much lymph from the media passes directly into the veins of the iris, ciliary body, and choroid, under normal conditions, we do not know. But it may be interference with this lymph flow, that makes obstruction of the passage through Fontana's space and Schlemm's canal so serious.

Any complete understanding of the pathogenesis of glaucoma will have to rest on full knowledge of the physiology of metabolism in the eye, including the biochemistry of nutrition, and the channels and regulation of the supply of nutrient fluid and removal of waste products through the circulation. The recent advances of our knowledge of the capillary circulation and of the mechanism that controls it, by the work of Krogh and his colaborers, have included studies of the circulation in the muscles, skin, intestine, and other abdominal organs of mammals. But the intraocular circulation in the eye of man has not been subjected to the same searching investigation. In the early years of ophthalmoscopy some studies of the influence of drugs upon the intraocular circulation were begun, but they were soon abandoned. Recently they have been resumed, with reference to the relations of blood pressure and intraocular pressure, with results that are promising but not entirely satisfying.

There is a good deal of current literature on the etiology of glaucoma; but too much of it has been produced to support or oppose some particular theory of the disease. Theory is needed to associate and explain the facts; but a true theory must explain all the facts, and we do not know all the facts about glaucoma. In the battle about theories some of the facts that are known are likely to be overlooked or ignored.

The great need now is more knowledge of the early history of glaucoma cases, and the long follow-up of the cases that did not reach operation. Not many of these will come before any one observer; but the accurate, careful, prolonged study of even a single case may be of great value. Such studies are always of value to the ophthalmologist who makes them, and a single one might throw important light on the causation of glaucoma; such a study, for instance, as that of Laqueur on his own eyes. When careful observations of this kind have been added to glaucoma literature in coming years by those in ophthalmic practice, and are joined with a knowledge of the physiology and biochemistry of ocular nutrition, we shall have a scientific understanding of the causes of glaucoma. Probably when that is attained most cases of glaucoma will be prevented; and while the better knowledge of glaucoma is being acquired many cases will be checked in the disastrous course that was formerly believed to be inevitable. *Edward Jackson.*

THE VISUAL ACUITY OF AUTOMOBILE DRIVERS

The problem of the visual requirements for automobile drivers is still subject to considerable discussion, and has reached a stage where legal cooperation is necessary to realize the benefits to be obtained from eliminating the visually unfit.

Professor L. Weekers of Liége has been a leader in this work, and his latest communication appearing in the Archives d'Ophtalmologie for December, 1929, crystallizes the sentiment of those interested in this problem who were present at the Thirteenth International Congress in Amsterdam. Weekers would simplify the legal question by placing upon the individual the responsibility for knowing his own physical fitness. The applicant would be merely required to certify to the examining board that he possessed the

physical qualifications necessary for licensure. He would do well to assure himself of this fact by having his own personal physician and oculist examine him. If the applicant or the examining board were doubtful as to his qualifications, a special medical commission employed by the state might be appealed to for decision of the question. When a driver was involved in an accident the law should require him to have a complete ocular and general physical examination, and, if he were found to lack the fitness prescribed by the law, his license to drive would be revoked. This system would eliminate the unfit driver at the first demonstration that a physical defect might cause him to be dangerous.

The minimum requirements for the nonprofessional driver as demanded by Weekers are:

1. Visual acuity, after correction, of at least 0.5 in one eye and 0.1 in the other. If a person blind in one eye had been so for at least one year and had a visual acuity of 0.8 in the other eye he would be acceptable.
2. A normal visual field in one eye.
3. No diplopia.
4. No marked diminution in the light sense.

In 1929, sixteen European countries required a medical certificate for a driver's license, and most of them made provision for reexamination at regular intervals. The visual requirements of Germany and Denmark approach those outlined by Weekers, while those of Sweden are more strict. In many cases the law merely asks for satisfactory visual acuity without exactly defining it. In the United States, according to a report of the Eyesight Conservation Council of America in 1925, only fifteen states required drivers' licenses, and of these only Pennsylvania had a definite visual acuity requirement. This was defined as twenty percent of normal vision, or the ability to distinguish substantial objects clearly at one hundred and fifty feet.

In California during the past year, all drivers were required to be relicensed and a visual acuity test was made. The interpretation of the law as to satisfactory visual acuity was left to the motor vehicle department. In the first examination a visual acuity of 0.4 with both eyes makes the applicant acceptable. The examination takes no cognizance of the fields, muscle balance, light sense, or separate acuity of the two eyes. One may be blind in one eye and pass the test, or may have tubular fields and be accepted.

As it is obviously impossible for the state to provide doctors or examiners to test the fields, muscle balance, and light sense of all applicants, Professor Weekers' plan seems quite practical. Naturally, many individuals would at first falsely certify as to their fitness, without first informing themselves as to their condition by going to their own oculists. But, if the law were strictly enforced, so that a person could see that it was to his own advantage to know his physical state before certifying it, the system would soon work in a satisfactory manner.

If this problem has assumed such great importance in European countries, where the number of automobile drivers is only a fraction of that in the United States, it is time for the oculists of this country to take more interest in furthering legislation to eliminate drivers of automobiles who are visually unfit. *M. F. Weymann.*

SOUR GRAPES AND SOME OPTOMETRISTS

The broad distinction between the professional and the commercial viewpoint is less important than the more precise contrast between honesty and dishonesty in either relationship.

Fortunately the majority of optometrists, whether regarded as professing a branch of the healing art or as skilled workmen and dealers in optical goods, maintain a praiseworthy degree of professional or business decency and straightforwardness in their dealings with the public.

But this compliment can hardly be paid to a group of so-called optome-

trists who, through an advertisement in the Evening Public Ledger of Philadelphia, recently exploited for their own advantage the unfortunate accident, rather vaguely reported some months ago by the Associated Press, by which a harmful drug was instilled into the eyes of a number of Greek children in mistake for eye drops.

"Optometrists", said the group advertisement, "know that drops are as dangerous as they are unnecessary". It is a safe guess that some at least of the optometrists who printed this statement are using one form or other of proprietary medicine in the treatment of their "patients". It is also very certain that, if the laws of Pennsylvania suddenly gave optometrists full professional status such as is enjoyed by duly qualified physicians, the very persons who attached their names to this unscrupulous advertisement in the Evening Public Ledger would not hesitate to resort to the very necessary expedient of cycloplegia as it is now practiced by the ophthalmologist.

Æsop derided a very common human failing when he invented the fable of the fox and the grapes.

W. H. Crisp.

BOOK NOTICES

Kurzes Handbuch der Ophthalmologie (Short handbook of ophthalmology), by forty-seven authors; edited by F. Schieck of Würzburg and A. Brückner of Basel. First volume, "Anatomy, development, developmental anomalies, heredity", by P. Eisler, A. Franceschetti, R. A. Pfeiffer, and R. Seefelder. Large octavo, 882 pages, 423 illustrations, many in colors. Berlin, Verlag von Julius Springer, 1930. Price of this volume, paper covers 134 marks, bound 138.60 marks.

This outstanding reference series on ophthalmology, written by a number of the best known authors of Germany and adjacent countries, is to consist of seven volumes. The first volume is a splendid example of the best in German scientific authorship and in German printing and illustrating. Many of the German-reading ophthalmologists throughout the world will wish to have the series in their libraries as an authoritative work of reference, presenting excellent and comprehensive monographs on distinct but carefully correlated branches of the subject.

The general plan of the series contemplates the avoidance of excessive discussion of the theoretical aspects of each section. The illustrations to the first volume are well selected from various authors; the discussion of the ocular fundus, for example, including color drawings from Oeller's atlas and from the more recent work of our own Würdemann. Sometimes the authors (as in Seefelder's handling of the developmental anomalies of the eye) have made excellent use of their own illustrations.

The section on anatomy of the human eye, to which 386 pages and 111 illustrations are devoted, is by Paul Eisler of Halle. Such surgically important details as the variations in the arrangement of the lacrimonasal duct are graphically shown, the intimate structure of the retina and choroid is lavishly illustrated, and the whole chapter forms a most substantial foundation for the series. The anatomy of the nerve centers and tracts is well covered in the second chapter of ninety pages, by Richard Arwed Pfeiffer of Leipzig (seventy-one illustrations), under the title "The nervous connections of the eye with the central organ". R. Seefelder of Innsbruck devotes forty-four pages and forty-six illustrations to the development of the eye, and 112 pages with sixty-five illustrations to congenital anomalies. The last chapter in the present volume is on the heredity of ocular disorders, by A. Franceschetti of Basel. This section occupies 126 pages, and has 129 illustrations, including a very striking photograph of a litter of young rabbits with congenital glaucoma, produced by the mating of two rabbits in which this congenital disorder had appeared.

Each separate chapter is accompanied by an important bibliography,

and in these bibliographic lists it is refreshing to find a rather generous mention of non-German names. The present volume as a whole carries name and subject indexes, the latter reasonably full. *W. H. Crisp.*

Le Trachôme (Trachoma). By A. Cuénod and R. Nataf (Tunis). 238 pages, 39 original plates in black and colors. Paper, price 50 francs. Masson et Cie., Paris.

Trachoma in the United States is confined to such a limited area that its importance as a world problem is hardly recognized here. In Italy, in the Balkans, in China, and in India it is enormously prevalent, and in Turkestan, where it probably originated, competent authorities report that ninety in every hundred inhabitants are affected. Egypt, visited by travellers from every part of the world, has from early times been one of its chief foci. In Tunis, at the ophthalmic clinic under the direction of one of the authors of this book, fifty percent of the patients are under treatment for trachoma.

Recognizing the importance of an accurate description of the disease, the definitions of Morax and of de Grosz are given. To these, with greater precision, the authors add the following: "Trachoma is a specific, contagious, and chonic affection localized in the conjunctiva of man (and experimentally in certain varieties of monkey). It is caused by a filtrable virus and characterized by numerous small follicular new-formations on the surface of the mucous membrane, on the ocular surface of the tarsus, where they become aggregated in new formations which are exceedingly slow in their development (months, even years), commonly accompanied by a procession of superadded affections but which occasion in their unmixed condition an inflammatory reaction which is moderate in character and insignificant in degree. In any case the condition tends to an atrophy of the mucous and submucous tissues particularly marked at the level of the tarsus, where it is quite apparent in the line of white cicatrices".

This long definition is provisional, but is necessary because of inaccurate observations common in this malignant disease.

The work covers the entire subject, including its incidence, symptomatology, complications, diagnosis, treatment, prognosis, etiology, and pathogenesis, together with an important chapter on prophylaxis. Some of the statements are worthy of careful consideration. For example, "One point on which the whole world is in accord is that trachoma is a malady that is found where there is wretchedness of living with poverty and the huddling of people together. It is at its greatest intensity where the hygienic conditions are the worst and it disappears with the progress of civilization". "This should be the starting point of all of our prophylactic measures".

"The danger to young children is emphasized, as they are especially vulnerable to attack. There are many reasons for this, the chief being familial promiscuity, truly formidable in trachomatous regions. Asepsis of the hands is difficult to obtain in adults and impossible of realization in the child. Especially is this true among the poor, where the little ones are so often left to themselves and where water is not easily obtained. It is here that the visiting nurse proves of the greatest aid."

In a foreword, the well-known pathologist Nicolle of the Pasteur Institute of Tunis says that "the rare ability of Cuénod as an observer and the terrible frequency of trachoma in Tunis give to this work recognized authority".

Since, as the authors show, it is in the more backward countries that trachoma abounds, it is here also that betterments can hardly be initiated in the absence of outside aid. It is hence not unlikely that the work of the International League Against Trachoma headed by Professor de Grosz, which meets next summer in Geneva, and also the International Society for the Prevention of Blindness under the leader-

ship of Professor de Lapersonne, may exercise on world conditions an influence of no little importance.

Park Lewis.

Société Belge d'Ophtalmologie, Bulletin no. 59. Minutes of the fifty-ninth meeting of the Society, Brussels, November 24, 1929. Paper covers, 106 pages. Brussels, Imprimerie Médicale et Scientifique, 34 Rue Botanique, 1929. Price not stated.

This annual volume of transactions serves in the first place as a directory of the members of the Society. Among the eight honorary members is our own cosmopolitan Professor de Schweinitz, as well as representatives of Italy, Spain, France, and Holland. In its twenty-four scientific communications are included a discussion by Moers of the use of the diathermic knife in orbital phlegmon, a paper by Rubbrecht on the closure of retinal tears, case reports of various ocular tumors, a case of multiple polyp of the conjunctiva of each eye, a description by Weekers of a method of treatment of painful seeing eyes by orbital injection of alcohol, a paper by Bichelonne on the history of toric and similar lenses, and a paper by Kleefeld on the local therapeutic use of insulin for corneal ulcer.

W. H. Crisp.

Ophthalmological Society of Egypt, Bulletin. Volume 22, 1929. Octavo, 136 pages, paper, 14 plates, 5 illustrations in text. Published by the Society, Cairo, 1929. Price 20 P.T.

These annual transactions, edited by a committee composed of five officers of the Society, constitute a real contribution to the current literature of ophthalmology, in which the 116 members and fifteen honorary members may well find satisfaction. The scientific contributions, numbering twenty-two, are arranged under fifteen headings much like those used in the Transactions of the Ophthalmological Society of the United Kingdom. The first paper, historical of Egyptian ophthalmia, by Demitriadis of Athens, is written in French. All the others are in English. But it is interesting to note that, at this twenty-sixth meeting of the Society, a committee was formed to select suitable Arabic technical terms, from old Arabic books when available, or translating the modern expressions into Arabic.

From the control of its founders this Society has passed wholly to that of Egyptian ophthalmologists. It might be feared that the political unrest and anti-English attitude that have been manifest with regard to some things in Egypt would cause some serious disturbance in the branch of modern western ophthalmology planted on this border of the Orient. It is reassuring to find among the honorary members the names of three who live in England, including Elliot and MacCallan. Still more significant is the prominence given to MacCallan's classification of stages of trachoma. These missionaries of British practical ophthalmology may rest satisfied that their labors have not been in vain.

The plates in this volume reproduce photographs and skiagraphs of striking cases, particularly of orbital tumors; and the text illustrations explain methods of operating and give fields of vision. It will be of interest to ophthalmologists in other countries to know that a limited number of back issues of the Bulletin are for sale, and can be obtained from the Honorary Treasurer and Archivist, Dr. Eisa Hamdy el Maziny Bey, Director of Ophthalmic Hospitals, Dawawin P.O., Cairo, Egypt.

Edward Jackson.

Giza Memorial Ophthalmic Laboratory, Cairo (Egypt). Third annual report, 1928. Issued for the Department of Public Health of the Ministry of the Interior (Egypt) by the Misr Press, Cairo. Paper covers, 112 pages, price not stated.

This surprisingly well illustrated an-

nual report of a philanthropic institution devoted to pathological examinations and research work, together with postgraduate teaching in ophthalmology, contains statistics of the specimens examined, reports of an important number of the more interesting cases encountered, and several scientific papers. From the pathological section comes the encouraging statement that during the last six years the number of eyes rendered blind by anterior synechiæ and adherent leucomata has fallen from 182 to 99. Almost without exception such eyes have been lost as the result of gonorrheal ophthalmia, and the reduction in the number of cases is welcomed as indicating that the benefit to be derived from ophthalmic hospitals is realized increasingly by the fellaheen, and that therefore the general condition of the eyes of the Egyptian people is improving steadily. A good deal is again said as to the results obtained in the use of chaulmoogra oil for trachoma. The oil is considered a valuable remedy but is not a specific.

A paper by the director of the Laboratory, Rowland P. Wilson, controverts the statement of Nicolle that follicles occasionally found in the eyes of various monkeys are due to trachoma. Wilson has found follicles in a number of monkeys' eyes, but regards the follicles as being usually the evidence of a simple folliculosis, although he admits that future research may show that follicular conjunctivitis is caused by an organism bearing a close relation to that which gives rise to human trachoma. *W. H. Crisp.*

ABSTRACT DEPARTMENT

Abstracts are classified under the divisions listed below, which broadly correspond to those formerly used in the Ophthalmic Year Book. It must be remembered that any given paper may belong to several divisions of ophthalmology, although here it is only mentioned in one. Not all of the headings will necessarily be found in any one issue of the Journal.

CLASSIFICATION

1. General methods of diagnosis
2. Therapeutics and operations
3. Physiologic optics, refraction, and color vision
4. Ocular movements
5. Conjunctiva
6. Cornea and sclera
7. Uveal tract, sympathetic disease, and aqueous humor
8. Glaucoma and ocular tension
9. Crystalline lens
10. Retina and vitreous
11. Optic nerve and toxic amblyopias
12. Visual tracts and centers
13. Eyeball and orbit
14. Eyelids and lacrimal apparatus
15. Tumors
16. Injuries
17. Systemic diseases and parasites
18. Hygiene, sociology, education and history

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1. GENERAL METHODS OF DIAGNOSIS

Barbieri, Antonio. **The luminous visual field and the pupillary reflex.** Arch. de Oft. de Buenos Aires, 1929, v. 4, Oct., p. 618.

Retinal sensitivity decreases gradually from the macula outward. In degenerations of the optic paths pupillary response suffers. In evaluating the degree of reaction, certain possible conditions must be borne in mind; (a) drug mydriasis, (b) third nerve paralysis, (c) synechiæ, (d) Argyll Robertson pupil, (e) spinal miosis (produced by or coincident with tabes or progressive paralysis).

The author terms his instrument a "photoperimeter pupilloscope," it being constructed along the general lines of the Gullstrand ophthalmoscope. There is a central combined observation and illuminating tube giving a magnified view of the pupil. Attached above is a quadrant graduated in degrees and casting a ray of light upon the center of the cornea irrespective of its position.

The examination is begun from the periphery, and the light is flashed on for two or three seconds. The pupil is seen to contract if that portion of the retina is sensitive, and the findings are plotted upon a record form, the same as the usual visual field. The far periphery of the retina can be illuminated by placing an opaque disc so as to protect the macular region, the luminous ring affecting the peripheral portions only. Various color fields can be determined the same way, by filters in front of the illumination.

A. G. Wilde.

Berg, Fredrik. **Comparative measurements of the anterior corneal surface with ophthalmometry and photography.** Acta Ophth., 1929, v. 7, p. 386.

The article contains a mathematical study of the principles underlying the work of a modified Javal ophthalmometer and a photographic apparatus, used by the author for measuring the anterior corneal surface. From measurements of the same corneas by these two methods the author concludes that the ophthalmometer is not inferior in precision to photography and has the advantage of being a simpler and less time consuming apparatus.

Ray K. Daily.

Fischer, F. P. **A new universal arc lamp.** Klin. M. f. Augenh., 1930 v. 84, Jan., pp. 79-83. (3 ill.)

Fischer has devised an arc lamp exclusively for ophthalmologists (manufactured by Heinrich Diel, Leipzig),

which serves simply and accurately for all methods of examination for which arc light is used. *C. Zimmermann.*

Lauber, H. **Sources of light for ophthalmoscopy in red-free light.** Zeit. f. Augenh., 1929, v. 69, Sept., p. 92.

The ordinary electric ophthalmoscope is not suitable for examination of the fundus in red-free light because the light intensity is too small. The arc lamp suggested by Vogt has a great disadvantage in that it is expensive, and for this reason Lauber has looked for substitutes. Of the several sources of light described as adequate the American reader will only be interested in those available here. The author describes a way of using sunlight, which Jackson had previously described, unknown to him, and the nitra lamp as used in the slit-lamp. Zeiss has made for him a casing which conveniently holds the lamp and the filter. Of all sources of light, the sun is doubtless the best. The nerve fibers, the yellow color of the fovea, and the retinal reflexes are much more distinct than with the arc light, and the intensity of illumination is more uniform. A fine piece of ground glass obviates the two obtrusive retinal reflexes. With the nitra lamp the entire field can be as uniformly illuminated as with sunlight. The yellow color of the fovea and the reflexes are less intense with the nitra lamp than with the arc light. The arc light gives a somewhat smaller ophthalmoscopically visible field than the other sources of light. *F. H. Haessler.*

2. THERAPEUTICS AND OPERATIONS

Aschner, B. **Retinal detachment and venesection.** Münch. med. Woch., 1929, Dec., p. 2135.

The publication of this article was stimulated by Jablonsky's report of a case of retinal detachment benefited by venesection.

The author, though a gynecologist, has had a good deal of experience with various eye conditions, and thinks that general medical treatment is altogether too often neglected by the specialist.

He enumerates the following therapeutic measures which in his opinion are very valuable in eye diseases:

1. Venesection, in retinal hemorrhages, especially in hypertension or pregnancy. It should also be used as a prophylactic in cataract operations where hypertension is present, to guard against expulsive postoperative hemorrhage.
2. Leeches, five or ten, on temple or back of ear in cases of iritis, glaucoma, retrobulbar neuritis, scleritis, and retinal detachment.
3. Cantharides plaster behind the ear in inflammatory diseases of the eye.
4. Catharsis in general inflammatory eye conditions.
5. Special medication in grey or black cataract. *M. L. Folk.*

Jahnke, Walter. **Leucocyte reactions of the eye.** Graefe's Arch., 1929, v. 123, p. 70.

Because parenteral irritants produce changes in the regulation of the vegetative equilibrium, the eye reacts in harmony with the remainder of the peripheral organs, that is in opposition to the splanchnic jurisdiction. One can deduce the leucocyte reaction of the eye from that of the skin.

Atropin, pilocarpin, adrenalin, and cocaine change the tonus of the ocular vessels, sometimes by means of pronounced contraction (particularly cocaine), at other times by pronounced dilatation (particularly pilocarpin), but the leucocyte count of the eye is not influenced thereby; with either narrow or dilated ocular vessels it corresponds with the leucocyte count of the skin.

Active hyperemia with dilatation and greater permeability of the vessels, produced by warm applications, shows relatively little leucocyte value compared with the leucocytosis after parenteral introduction of albumen. Milk injections given in the neighborhood of the eye appear to cause no greater leucocytosis of the eye than the same injections in any other part of the body.

H. D. Lamb.

Liebermann, L. **The indication for orbital anesthesia, with remarks on a new anesthetic.** Klin. M. f. Augenh., 1930, v. 84, Jan., pp. 74-75.

Orbital anesthesia is indicated whenever subconjunctival injection of novocaine will not be sufficient. Its dangers, hematoma or infection, can be avoided by not using thick needles and by injecting while moving the needle forward, as the blood vessels escape in the infiltrated tissue. An addition of 0.2 per thousand of rivanol acts as an antiseptic. The author found 1 to 1,000 solutions of the new anesthetic percaine equivalent to two percent novocaine solution, and excellently adapted for eye operations. (Percaine is manufactured by Ciba, Basel.)

C. Zimmermann.

Löwenstein, Arnold. **A clamp forceps for excision of mucous membrane of the lip for plastic operations.** Klin. M. f. Augenh., 1930, v. 84, Jan., pp. 83-84. (2 ill.)

The lip clamp which is described and illustrated stretches the mucous membrane of the mouth and renders excision for transplantation purposes easy and complete without the aid of an assistant. It is manufactured by Fischer of Freiburg-i.-B.

C. Zimmermann.

Meyer, Hellmuth. **Luminal for facilitating eye operations in children.** Klin. M. f. Augenh., 1930, v. 84, Jan., p. 69.

Within the last year luminal given preparatory to eye operations in children at the Axenfeld's clinic in Freiburg has proved to be very valuable, and without any bad effects. The doses were 0.02 gm. at the age of four months, 0.05 gm. at one year, 0.06 gm. at two years, 0.09 gm. at five years, 0.10 gm. at six years, 0.15 gm. at twelve years, and 0.2 gm. for adults. It is administered one hour before applying local or conduction anesthesia or ether narcosis.

C. Zimmermann.

Pellathy, Bela. **Experimental investigations on the introduction of drugs into the anterior chamber.** Klin. M. f. Augenh., 1929, v. 83, Dec., pp. 758-773. (3 ill.)

After injection of physiological and two percent salt solutions, sterile water, or one percent solution of bicarbonate of sodium into the anterior chamber of rabbits, fibrin and formed elements were observed in the aqueous, beside changes near the puncture in the cornea. All symptoms subsided after a few days, and the function of the eye remained intact. Injection of silver preparations may cause corneal opacities, uveitis, even panophthalmitis. After optochin especially the lens is affected. Rivanol and trypaflavin cause moderate irritation of the iris, which subsides in a few days. Of bactericides rivanol and trypaflavin are best tolerated. Intraocular infections could not be cured by intraocular injections of trypaflavin solutions, which only mitigated the course of the affection. Since the infections were extremely violent, a better result might be hoped for in slight infections, especially in combination with general treatment.

C. Zimmermann.

Perrin, Robert. **Subconjunctival injections of atropin sulphate in ocular therapeutics.** Arch. d'Opht., 1929, v. 46., Nov., p. 672.

When instillations of atropin do not have the desired effect, two drops of 0.5 percent solution are injected under the conjunctiva in adults and one-half drop in infants. Eight days should elapse between injections. Ulcers, keratitis, iritis, and iridocyclitis are indications for injection where instillation is not effective. The contraindications are the same as those for instillation. No case of poisoning has been observed and no glaucoma has been induced, but the tension is taken before injecting suspicious cases. The effect of injection is much more powerful than that of instillation.

M. F. Weymann.

Pflimlin, R. **Practical results with panthesin** (Sandoz). Klin. M. f. Augenh., 1930, v. 84, Feb., pp. 270-274.

The new anesthetic panthesin (Sandoz) has been used for over a year at the eye clinic in the University of Basel. The following conclusions are reached: Panthesin in 0.5 percent solutions is a superficial and deep anesthetic and an effective substitute for cocaine. Its lesser toxicity permits of injecting greater quantities. By addition of adrenalin its anesthetic action is increased and its hyperemic effect eliminated. It has no secondary effects such as pain or damage to the epithelium of the cornea.

C. Zimmermann.

Wätzold, P. **The value of Merck's "iodine rods" in ophthalmology.** Münch. med. Woch., 1930, v. 77, Jan. 3, p. 18.

The valuable therapeutic properties of iodine could not be utilized in ophthalmology because of the difficulty of limiting the effect of the lesion. The recently perfected colloidal iodine rods, which liberate iodine only in contact with water, have been tried by the author on his own eyes and in a variety of conditions, such as ulcus serpens, superficial as well as deep corneal infiltrates, corneal dystrophies, and acute and chronic conjunctivitis resisting other treatments, with extremely gratifying results. The deeper action of the colloidal iodine as compared with the superficial effect of the tincture and of the aqueous solution is pointed out.

M. Davidson.

3. PHYSIOLOGIC OPTICS, REFRACTION, AND COLOR VISION

Ahlenstiel, H., Sachs, E., and Streckfuh, H. **The use of filters in color blindness.** Arch. f. Augenh., 1929, v. 102, Dec., p. 271.

A filter combination is given, that in both main types of dichromatism permits the correct naming of colored objects. The so-called color loupe consists of a red and a green glass fixed alongside one another. The observation is carried out by passing the two parts of the "loupe" before the eye. In both the red-blind and the green-blind, two different "loupes" are ordered, one to be used for daylight and the other for artificial light. The method of determining the filter is also described. *Frederick C. Cordes.*

Berens, Conrad. **Studies on immunity in relation to ophthalmic vaccines and nonspecific therapy.** Ann. d'Ocul., v. 166, 1929, Dec., no. 12, pp. 935-951.

Care should be taken that standardized protein preparations are used. In superficial ocular infections associated with chronic infection of the nasal mucosa, a mixed nonspecific catarrhal vaccine has been as efficacious as autogenous vaccines. The intradermal method seems a good way to determine the organism to which the individual is hypersensitive, and autogenous vaccines of the organism act most beneficially. Care must be exercised if the individual is markedly hypersensitive, and better results are obtained if foci of infection are drained. In nonspecific therapy one must be careful about hypersensitivities, asthma, etc. Regarding tuberculin therapy, it is possible that ophthalmologists have been overenthusiastic, attributing good results to the tuberculin, whereas good food, light, and other facts have been responsible. *Lawrence T. Post.*

Heine, L. **Correction of various ametropias by means of ground contact glasses.** Münch. med. Woch., 1930, v. 77, Jan. 3, p. 6.

The author uses a series of ground contact glasses prepared by Zeiss, with radii of curvature ranging between 5 and 10 mm. Given an average radius of corneal curvature, this series can correct from 15 D. of hyperopia to 20 D. of myopia. The main problem is the proper fitting of the scleral rim, which has a radius of about 12 mm., to the individual globe. This should be done by the physician himself and necessitates sometimes several sessions. Con-

tact glasses are, in his opinion based on a large experience, less dangerous to the wearer than spectacle lenses. No injuries to the eyes have so far resulted, even in those cases in which the contact glasses have been broken while in contact with the globe. Toleration depends on careful fitting, and is at first limited to a few hours. In high ametropias, particularly astigmatism, better visual acuity has been secured than with lenses. The benefits of the larger field of vision and of fixation and the elimination of muscle anomalies accompanying the ametropias are stressed, and also the acquiescence in the use of the contact glass by those who had refused to wear spectacles for cosmetic and social reasons. Some cases have shown a diminution of their astigmatism. Even a reduction in myopia from 10 to 8 D. has been observed following their use for two to three years. They have also affected beneficially any coexisting hypertension. Their use in attempting to cure progressive myopia in children is suggested, since it should be even easier to cure 2 D. of myopia in a child than to take off 2 D. of the high myopia of the adult. *M. Davidson.*

Levinsohn, G. **Further review of myopia.** Arch. f. Augenh., 1929, v. 102, Dec., p. 308.

From a review of the subject, Levinsohn comes to the following conclusions concerning myopia: The myopic changes in the vast majority of instances are acquired and not congenital. Myopia is seldom present in the newborn eye. It develops at a time when the normal growth of the eye is almost concluded. The myopic changes are the result of a gradual stretching of the eye. They are most apt to develop in the presence of a congenital tendency and faulty position of the head, as shown in experiments on apes.

Frederick C. Cordes.

Ricci, E. **Various uses of my luminous centesimal optometer.** Ann. di Ottal., 1929, v. 57, Aug.-Sept., p. 688.

This instrument was described in the Annali in 1923. The conditions essential for complete utilization of the visual function are: (a) anatomical integrity of the eyes, of the nerve pathways, and of the visual centers; (b) correspondence of the external light-sensitive layer of the retina with the posterior focal point; (c) sufficient intensity and duration of the luminous stimulus; (d) adequate size of the fixation object.

By the method which the author employs a definite degree of illumination is obtained, as the letters are projected upon the screen with a difference of from 1/100 to 1/500 in amplitude, thereby permitting greater exactitude in obtaining refractive values. By means of a suitable diaphragm and a rheostat, the instrument measures the light adaptation and through the color sense is of value in detecting malingering. *Park Lewis.*

Rössler, F. **Determination of refraction with the cobalt lamp.** Klin. M. f. Augenh., 1930, Jan., pp. 13-38. (9 ill. 12 col. pl.)

The determination of refraction with the cobalt lamp is a method by which a certain refraction of the eye may be inferred from the behavior of the red and blue color components as seen by the patient, a red center with blue fringe, or a blue center with red fringe, being seen by the patient according to certain astigmatic variations. The test is subjective and requires the cooperation of the patient but properly used is delicate. It rests on the cobalt-glass experiment of Helmholtz. Cobalt glass has the property of absorbing the greatest part of the visible spectrum, transmitting the rays of the extreme ends. (See Helmholtz' "Physiological optics"). This elaborate discourse on the subject should be read in the original. *C. Zimmermann.*

Trendelenburg, Wilhelm. **Diagnostics of abnormal color sense.** Klin. M. f. Augenh., 1929, v. 83, Dec., pp. 721-732. (1 ill.)

Systematic methods with Nagel's anomaloscope or similar smaller spectral apparatus are recommended for this examination of congenital anomalies of the color sense and their differentiation, especially with regard to heredity. For the anomalies separate tests of the color sense with and without exhaustion are demanded. The differences between anomalous and normals must be ascertained in numbers by formation of a quotient. All these points are presented in a detailed discourse. *C. Zimmermann.*

Weber, Fritz. **High myopia in pregnancy.** Zeit. f. Augenh., 1929, v. 69, Nov., p. 344.

Stimulated by Birch-Hirschfeld's recent essay the author reports two cases of high myopia in which the eye was not in the least damaged by pregnancy. The author has seen other patients of the same kind in his thirty years of practice, and, although he does not have access to their records, he does not remember a single case in which pregnancy or labor caused damage to the myopic eye. He does not deny that such harm may occasionally follow, but he believes that high myopia only rarely justifies therapeutic abortion.

F. H. Haessler.

4. OCULAR MOVEMENTS

Adrogue and Balado. **Pathology and therapeusis of oculogyral crises.** Arch. de Oft. de Buenos Aires, 1929, v. 4, Nov., p. 683.

This condition has been recognized for many years, and an example is seen in the painting "The transfiguration" by Raphael. For several centuries references have been made to an association of strabismus with attacks of fever. Jelliffe reviewed two hundred such cases published between 1921 and 1929. Many gave a history of convulsions, chorea, or tremors, accompanied by fever. Later there were periods of somnolence, with development of Parkinsonian rigidity.

Coincidentally there are deviations of the eyes in various directions, most frequently up or down. At times they remain rigidly fixed forward. The duration of the attacks varies from a few seconds to several hours, and the attacks are entirely beyond the will. They have been ascribed to irritations of the labyrinth, or to a type of epilepsy. Freud believes them to be purely psychic.

Three cases are reported, all appearing in females, the ages varying from six to twenty years. One had a febrile history, with a Parkinsonian postencephalitic syndrome. In the other two the ocular rigidity appeared without recognizable cause, but was regarded as hysterical in origin.

In the first scopolamin was used hypodermically, beginning with 0.0002 gm., gradually increasing to 0.0005 gm., and during this time the attacks ceased. Where the Parkinsonian syndrome was not present, bromides were used with apparent benefit. These oculogyral crises are not regarded as the product of any single cause. An extensive bibliography is attached.

A. G. Wilde.

Agnello, F. **Five cases of ophthalmoplegic migraine.** Riv. Oto-Neuro-Oft., 1929, v. 6, Sept.-Oct., pp. 405-445.

All the patients gave the history of characteristic recurrent attacks of pain in one side of the head and showed partial or total paralysis of the corresponding oculomotor nerve. The attacks of pain ceased, in some cases, to be followed by the paralysis; in others they continued for some time during the paralytic period. In one case the disease manifested itself first in one side, and on the second attack in the other side of the head. The disease lasted a few days or many weeks. In some cases there was a complete recovery from the paralysis, in others the paralysis of some branches of the nerve was persistent or permanent. Three of the patients were female and the age limits were eighteen and seventy-four years. The author gives the different theories on the etiology and pathogenesis of the disease and distinguishes

two types of ophthalmic migraine: symptomatic, due to organic disease of the brain, developing near the nucleus or the point of emergence of the nerve, and essential or true hemicrania, characterized by attacks of pain and total disappearance of the paralysis. The latter is to be considered a variety of ordinary hemicrania, that is, a hemicrania which is accompanied or followed by a temporary oculomotor paralysis, being even a result of the same pathogenic factor, that is, of a vasomotor disturbance (angiospasm) in the brain region of the oculomotor. (Bibliography and 7 figures.)

Melchiore Lombardo.

Antonibon, A. **Graphs of the movements of the eye in reading.** Ann. di Ottal., 1929, v. 57, Aug.-Sept., p. 673.

It has long been known that in the act of reading the eye does not move steadily along the line but makes rhythmic jumps. Various methods have been used for studying these movements. The author's mechanism is more simple and more exact than the others. The upper lid is lowered and on it is placed a small drum of fine rubber from which the air has been exhausted. In the center of this is placed a flat button which communicates by means of a delicate rubber tube with the usual rotating drum of Marey covered with smoked paper. In the act of reading the needle forms a line interrupted at regular intervals by elevations produced by the movement of the ball. The difference in the frequency of the jumps in the facile reader and in the untrained—as in one reading a foreign language—is shown in the resulting graphs. *Park Lewis.*

Bartels, Martin. **Voluntary nystagmus and the conditions under which organic nystagmus can again be elicited voluntarily.** Klin. M. f. Augenh., 1930, v. 84, Jan., pp. 3-13.

Purely voluntary nystagmus in otherwise healthy eyes and normal body is generally associated with convergence and miosis, sometimes with spasm of accommodation or elevation of the lids. Its type is not a jerking nystagmus, but a regular oscillation, usually horizontal, but also rotatory and vertical, mostly on looking straight ahead. Generally it is of short duration. Only the first impulse to it is voluntary, the individual oscillation cannot be controlled. Its innervations are not yet elucidated. Miners' nystagmus cannot be voluntarily created for the first time. But miners who suffer or have suffered from nystagmus may reelicit it by strong innervation of the muscles and by producing congestion of the head (as by compression of the jugular veins). Increases in the pressure of the cerebrospinal fluid, by the manipulations which again evoke the nystagmus in miners, act on the nystagmus centers in the thalamus. Judging from clinical observations and from experimental dark nystagmus in dogs (which shows the greatest similarity to miners' nystagmus), the vestibular apparatus cannot be the cause of nystagmus in miners.

The methods of examination are of great practical importance, because during examination a miner may not show nystagmus, but the condition may reappear in the mine at a certain depth, being caused by the above mentioned factors. *C. Zimmermann.*

Frenkel, H., and Calmettes, M. **Observations on a case of monolateral internal ophthalmoplegia as the only symptom of cerebral syphilis.** Arch. d'Opht., 1929, Sept., v. 46, p. 535.

In January, 1926, a woman aged thirty-five years noticed headache and difficulty in reading. On examination the right pupil was found dilated and fixed and there was practically no accommodation. After specific treatment the pupil became active and the accommodation was partially recovered. Over a course of three years the condition of the right eye varied in proportion to the Wassermann reaction and treatment received. It is possible that separate blood supplies may account for the affection of the intrinsic portion

of the third nerve without disturbance of the extraocular muscles. Most cases of internal ophthalmoplegia that are nontraumatic may be considered due to syphilis, and a Wassermann on the spinal fluid is of value. The remarkable feature of this case is the improvement under treatment. The literature is reviewed as to case reports of this condition. *M. F. Weymann.*

Nemlicher, L. J., and Rappoport, B. J. **On a case of congenital pseudonuclear ophthalmoplegia (aplasia of cortical centers of fixation?)** Klin. M. f. Augenh., 1930, v. 84, Feb., pp. 206-222. (2 ill.)

The detailed statement of the associated disturbances of ocular movements in this case does not lend itself to abstract. The especial peculiarity of the case is briefly stated by the authors as lying in the fact that in this case the dissociation between voluntary and involuntary movements occurred in a different plane from that involved in the other cases which have appeared in the literature; the dissociation being between automatic and purely reflex movements instead of between voluntary and automatic.

C. Zimmermann.

Reitsch, W. **Partial ground glass lenses for diplopia.** Zeit. f. Augenh., 1929, v. 69, Oct., p. 237.

Frequently one prescribes ground glass to obviate diplopia in eye muscle paralysis. It does not seem necessary to the author to block the vision of the paretic eye in those parts of the field in which diplopia does not exist. Therefore, he uses lenses in which only a part of the surface has been dulled by grinding. A set of six lenses, in which are opaque areas of variable size bounded by straight, concave, and convex lines, serve for the trial case. These were made for him by Zeiss.

F. H. Haessler.

Smith, K. R. **Defective sight and sight education.** Brit. Jour. Ophth., 1930, v. 14, Jan., p. 16.

The author of this excellent contribution takes the position that absence of binocular vision in concomitant strabismus is the result of a defect in the visual centers. The disorder is a sensory one. It is a defect of vision, but not of the eyes or of the parts which move them, for each eye may, and often does, perform its normal functions separately from the other. Retinal impressions must reach and induce molecular changes in the cells of the visual centers to excite visual sensations. When an object attracts mental attention, then fixation by the eye which sees it follows. Ignoring these true sequences will lead to failure in any operative measure. Life begins with each eye a separate alternative doorway to our clearest sense of sight. From this infantile vision the higher type of adult sight, binocular vision, develops by education.

Civilized conditions impose upon children prolonged use of the eyes in near vision in learning to read and to write before the power to retain binocular vision for near objects has been fully acquired, at a period when instability of the adult type of sight is marked by the liability to strabismus, and no attempt is made to assist development of the sight to its adult type of education. Our sense of sight, like most human faculties, needs education, natural or otherwise, for its development to normal adult condition. Binocular vision as a completely spontaneous function is the object sought by education. *D. F. Harbridge*

5. CONJUNCTIVA

Afanassieva, H. A. **Erroneous interpretations of the corpuscles of Prowazek.** (Remarks about an article by Dr. Trapesontzeva of Moscow.) Rev. Internat. du Trachôme, 1929, v. 5, April, pp. 55-64.

The author gives a lengthy criticism of Trapesontzeva's work. The Prowazek bodies are easily confused with many other cell inclusions. A detailed description of these bodies is given, and

other opinions in the literature are cited. *George H. Stine.*

Cuénod and Nataf, Roger. **Ultravirus and trachoma.** Arch. d'Opht., 1930, v. 46, Jan., p. 45.

The question is raised as to whether an ultravirus may not be associated with bacterium granulosis in the causation of trachoma. Three facts are presented which suggest that an ultravirus may be a causal factor in trachoma; first, the virus is filterable; second, affections from ultravirus cause cytological pictures of cell inclusions such as are found in trachoma; third, trachoma is frequently associated with other conjunctivitis, which fact would tend to point toward a symbiosis of organisms. *M. F. Weymann.*

Guerra, P. **Experimental researches on all forms of spring catarrh.** Arch. di Ottal., 1929, v. 36, July-Aug., pp. 302-328, and preceding number.

This article is a very exhaustive and comprehensive enumeration of etiologic factors of vernal catarrh. According to the author the sensitizing agent, probably of endocrine origin, which accumulates in the blood, is the cause of the characteristic photodynamic symptoms in vernal catarrh. *David Alperin.*

Heckel, E. B. **Gonococcic purulent conjunctivitis.** Jour. Amer. Med. Assoc., 1929, v. 92, May 11, p. 1582.

The gonococcus is instantly killed at a temperature approximately freezing, or after short exposure at from 41° to 42° C. (105.8° to 107.6° F.). Considering these facts, and that the human eye tolerates cold better than these higher temperatures, Heckel advocates most strongly the use of iced physiologic saline by irrigation in the treatment of gonorrheal conjunctivitis in both infants and adults.

The technique in irrigating the eyes with iced physiologic saline for eight or ten minutes every six hours throughout the twenty-four, with the application of iced pads during the intervals. By first douching the lids externally, the swelling is reduced so that the lids may be everted, and the conjunctival sac is then slowly and freely irrigated.

Diagnosis is most important, as this method is useless in a purulent conjunctivitis due to other organisms. Smears should be made daily to control the treatment; they are usually negative at the end of forty-eight or seventy-two hours when the eye is restored to normal. When corneal involvement occurs no other drug than atropine is needed. Heckel has used this method successfully as a substitute for Credé's method, but Credé's method is simpler and quicker. *George H. Stine.*

Jaeger, Ernst. **Rivanol.** Klin. M. f. Augenh., 1930, v. 84, Jan., pp. 93-95.

Rivanol 0.02:10.00, used constantly for four years, proved to be a reliable nonirritating disinfectant for the conjunctiva. It is indicated previous to operations and in every kind of conjunctivitis with positive bacteriological findings, including blennorrhea neonatorum. It can be used with other drugs, except zinc sulphate. The use of freshly prepared solution, kept in dark bottles, is important. It is contraindicated in the presence of epithelial defects of the cornea. *C. Zimmermann.*

Lacat, C. **Trachoma and purulent ophthalmia.** Rev. Internat. du Trachôme, 1929, v. 5, April, pp. 64-68.

A general review of the treatment of trachoma, with special reference to inoculation with gonorrheal ophthalmia in severe cases, is given. Accepting for the present the theory of Nicolle (chemical origin), the author stresses the importance of hygienic measures in the prophylaxis of trachoma. *George H. Stine.*

Langendorff, F. J. **Presojod ointment in ophthalmology.** Zeit. f. Augenh., 1929, v. 69, Oct., p. 240.

Presojod is a proprietary inorganic iodine solution which contains relatively large amounts of iodine. The

iodine, however, is only freed by organic acids which are liberated at the site of the lesion. In the form of an ointment it has been successfully used in catarrhal inflammations of the conjunctiva and lid margin. Its advantage lies in the fact that it acts as a disinfectant and astringent without irritating the eye. *F. H. Haessler.*

Lyritzas, D. **Contribution to trachoma therapy.** Arch. f. Augenh., 1929, v. 102, Dec., p. 377.

Lyritzas gives his method of treatment of trachoma as used in two hundred cases in Greece. He starts with an excision of the tarsus not only in the early cases but in all cases. Only a tarsectomy is done, without any attempt at removal of the affected conjunctiva. For one month after this, the conjunctiva of both lids is touched up daily with one percent silver nitrate. In the course of the month there is a considerable overgrowth of connective tissue at the site of the operation. This is then trimmed off evenly with scissors so as to produce a flat scar. If many follicles are present, they are expressed by the Knapp forceps. The second month, silver nitrate is used twice a week; the remaining days, zinc drops are used. Approximately two months are required to effect a cure. Lyritzas considers tarsectomy so important that he will not treat a patient who refuses this operation. He gives in detail his method of tarsectomy.

Frederick C. Cordes.

Meyerhof, Max. **On some severe forms of trachoma seen in Egypt.** Rev. Internat. du Trachôme, 1929, v. 5, April, pp. 69-75.

The subject is briefly discussed as to incidence, clinical appearance, and treatment under eight headings: (1) severe trachoma in children; (2) hypertrophic form; (3) trachoma and vernal catarrh; (4) disproportion of conjunctival and corneal affections; (5) trachomatous interstitial keratitis; (6) gelatinous (colloid) degeneration; (7) marked shrinking of the conjunctival sac; (8) trachomatous xerosis. The paper is quite comprehensive, but too detailed for abstraction.

George H. Stine.

Monbrun, A. **Trachoma and surgical diathermy.** Rev. Internat. du Trachôme, 1929, v. 6, Oct., pp. 145-165.

Monbrun describes in detail the technique of destruction of trachomatous granulations and pannus by diathermocoagulation. It is desirable that the disease be in its chronic stage but otherwise there are no contraindications. Three methods are used, according to the depth of coagulation desired. The first is the classical method with two electrodes, modified only by the fact that the indifferent electrode does not rest directly on the skin but is separated from it by the clothes which act to form the dielectric of a condenser. This method permits an extensive coagulation of tissue which can be utilized for destroying the more important granulations of the palpebral conjunctiva. The second method employs only a single electrode which is kept in contact with the tissues and which has only a superficial action. This is indicated for use in peritomies and for destroying discrete conjunctival granulations, pannus, and hair follicles. The third method is similar to the second except that the electrode is held one or two millimeters from the surface to be coagulated, allowing a spark to jump across, producing a minimal coagulation. This gives the maximum security in treating pannus, and is convenient also for destroying very fine granulations.

The author emphasizes the dangers of diathermy in unskilled hands, and advises the operator to be perfectly familiar with the action of his machines in order to avoid too extensive necrosis. When properly used, diathermy constitutes the best agent in the destruction of trachoma because of the suppleness of the resulting scars. Its use eliminates the expensive hospital facilities which are required in the ordinary surgical procedures, and it has the advan-

tage of being rapid and bloodless and also of allowing the patient to return to his occupation immediately without requiring further dressings. The resultant scars, because of their extreme flexibility and suppleness, are not followed by secondary contractions. Monbrun is well satisfied with the end results in the numerous cases treated during the past four years. *Phillips Thygeson.*

Morax, V. **Corneal complications of trachoma.** Rev. Internat. du Trachôme, 1929, v. 5, April, pp. 90-94

Morax studied with the corneal microscope a certain number of cases of trachomatous pannus tenuis, and stained sections obtained by biopsy. The slit-lamp showed two main features of pannus tenuis: (1) new-formed vessels, and (2) small grayish spots with irregular diffuse margins, both in the same plane in the superficial layers of the cornea. The small gray spots preceded the formation of new vessels. The stained sections showed that the gray spots were produced by an infiltration of mononuclear cells and histiocytes between Bowman's membrane and the superficial corneal lamellæ.

It is concluded that the involvement of the cornea is an infectious process identical with that of the conjunctiva, and is not a lesion due to mechanical friction produced by the thickened tarsal mucous membrane.

George H. Stine.

Moretti, E. **A new operation for trachomatous corneal pannus.** Ann. di Ottal., 1929, v. 57, Aug.-Sept., p. 677.

In certain forms of pannus crassus peritomy has been found of value, but it is occasionally followed by symblepharon in eyes so predisposed. To avoid this complication the author has devised what he terms the limbus raphia operation. After generously flushing the conjunctiva with physiological solution a 4 percent solution of tutocain is instilled and 0.5 cm. of a 2 percent solution injected under the superior bulbar conjunctiva. A speculum is introduced, and with fixation forceps the ball is drawn down. A running stitch of no. 0 catgut is inserted at the three o'clock and carried to the nine o'clock position. In order that the cornea may not be abraded, the first suture should not be inserted closer than 2.5 mm. from the limbus and the second 1.5 mm. from that. (Bibliography.) *Park Lewis.*

Papolczy, Franz. **Plasmoma of the conjunctiva with especial reference to trachoma.** Klin. M. f. Augenh., 1929, v. 83, Dec., pp. 788-797. (3 ill.)

Papolczy observed within seven years five cases of plasmoma, a tumor of the conjunctiva consisting of plasma cells, the diagnosis being corroborated by histological examination of excised pieces. The tumors were located in the superior retrotarsal fold, the plica semilunaris, and the caruncle, and projected from the palpebral fissure, interfering with complete closure of the lids. The conjunctiva covering the tumor and the skin of the lids were in all cases intact. Development generally takes many years. In these cases the vessels were chiefly in the connective tissue septa. There was no perivascular arrangement of the plasma cells, as mentioned by most authors, so that their origin from the cells of the adventitia seems improbable. There was intracellular hyaline degeneration in one case. The tumor is of benign character, does not infiltrate the adjacent tissues or extend into the orbit, and never forms metastases. Only the part which hinders the movements of the eyelids needs to be removed, the remainder is absorbed. In half of the cases in the literature and in four out of the author's five cases the affection occurred in combination with trachoma. The fact that the author observed a transition between trachoma and plasmoma suggests a more profound connection between the two conjunctival affections than hitherto supposed. *C. Zimmermann.*

Reitsch, W. **Anatomical description of the fornix, caruncle, and semilunar fold.** Zeit. f. Augenh., 1929, v. 69, Oct., p. 207.

The author presents the descriptive and topographic anatomy of these structures in detail, but his article is not suitable for abstracting.

F. H. Haessler.

Simko. **Observations on the treatment of trachoma with intravenous copper.** Bratislavske Lek. Listy, 1929, Dec., p. 1275.

In search of a remedy which would shorten the treatment time of trachoma, the author administered a copper solution intravenously every four days in thirty cases of trachoma; some of these cases were acute, some chronic, and fifteen had corneal involvement; the patients were also treated locally. A comparison of the course of the disease in these patients with that in others who did not have intravenous medication leads him to conclude that intravenous injections of the copper solution act favorably in alleviating the irritating symptoms, but do not shorten the treatment time. *Ray K. Daily.*

Taboriski, J. **Experimental and clinical observations on trachoma and trachoma-like diseases of the conjunctiva.** Graefe's Arch., 1929, v. 123, p. 140.

After observing the results in twenty experiments of artificial transmission of secretion from eyes with trachoma and follicular conjunctivitis to the blind eyes of human patients with normal conjunctivæ, the author concludes that simple follicular diseases of the conjunctiva without deep infiltration or Halberstädter-Prowazek bodies can produce only follicular conjunctivitis or catarrhal conjunctivitis but not true trachoma. The transference of true trachoma was constantly successful. Before the discovery of cell inclusions it was not possible to differentiate early cases of trachoma from those of follicular conjunctivitis. *H. D. Lamb.*

Teräskeli, Hilja. **Studies on the behavior of the cutaneous capillaries in trachoma and follicular conjunctivitis.** Acta Ophth., 1929, v. 7, p. 424.

This study was undertaken in order to throw additional light on the as yet unsettled question—is there a constitutional diathesis in trachoma and follicular conjunctivitis? Some authors, as Michaeljan, Kruglow, and Tarnopolski, believe that trachoma and follicular conjunctivitis are local diseases, independent of any constitutional abnormality. Others, as Brana, Nevot, and Angelucci, maintain that trachoma is a manifestation of lymphatic or scrofulous diathesis. In the examination of twenty-nine trachoma patients the vascular anomalies observed were enlarged caliber of the capillaries in forty-one percent, sinuous course in eighty-three percent, a sluggish blood stream in sixty-two percent, and variations in the velocity of the blood stream with granular and irregular blood column in nearly all cases. In forty-five cases of folliculosis and follicular conjunctivitis, the anomalies consisted of sinuous course in 77.7 percent, and diminished velocity of the blood stream in twenty-five percent. The blood column was usually irregular, granular, and rarely homogeneous. These findings indicate that the vascular state is similar in trachoma and follicular conjunctivitis, and resembles the so-called vasomotor neurosis seen in lymphatic diathesis and other constitutional disturbances. It is also not unlike the vascular picture observed by Enroth and Hisinger-Jagerskiøld in parenchymatous keratitis. The author concludes that a constitutional anomaly is a factor in the development of trachoma and of follicular conjunctivitis. *Ray K. Daily.*

Tessier, G. **Further contributions to the cure of vernal catarrh by the injection of adrenalin.** Ann. di Ottal., 1929, v. 57, Aug.-Sept., p. 631.

In a previous paper the author had discussed the action of adrenalin in spring catarrh. Here he gives detailed reports of eighteen cases in which the remedy was used subconjunctivally. He notes that the disease is most frequently met in seaports and, without attempting to explain the reason, in that way he accounts for the large number

of cases met with in the clinic at Venice. The patients were all young, with a single exception being under seventeen years. The injections were given in one eye at a time on alternate days. The length of treatment was variable but usually only a few months, with satisfactory recoveries. Lagrange's views on endocrine imbalance in this connection are considered. Professor Brunetti notes that the local injection of adrenalin has markedly modified the attacks of hay fever. The author urges that small doses be employed but continued for a long time.

Park Lewis.

Weekers, L. **The importance of terrain in ocular diseases.** Arch. d'Opht., 1930, v. 47, Jan., p. 13.

A statistical study is presented as to the relative frequency of phlyctenular disease with reference to age and sex. The etiology of the conditions is thought to be a sensitivity or allergy for toxins of the tubercle bacillus, this allergy being manifested in the eye by phlyctenules. It has been shown that the female sex reacts more strongly to normal horse serum than the male, and is therefore more susceptible to allergic phenomena. A preponderance of phlyctenular disease is seen in females, especially during the years of childhood. There seems to be some relation between the occurrence of phlyctenules and the menopause. The article is accompanied by tables and diagrams.

M. F. Weymann.

Wilson, R. P. **New notes on the etiopathological problem of trachoma.** Rev. Internat. du Trachôme, 1929, v. 5, April, pp. 76-90.

Examining the conjunctiva in a series of monkeys prior to inoculation with emulsions of Noguchi's bacillus, Wilson discovered a type of folliculosis which raised the question of the possibility of spontaneous trachoma in monkeys. In a series of sixteen animals (chimpanzee, gibbon, macacus, cercopithecus æthiops, and lemur) eighty percent showed definite follicles, of two types, the first appearing as a normal lymphoidal hypertrophy, and the second occurring in a congested conjunctiva with a thick mucous discharge. However, in no case were the follicles seen on the tarsal conjunctiva, nor were there cicatricial changes, ulcers, pannus, and so on.

Considering the different points in the differential diagnosis of trachoma in the human, Wilson concludes that these appearances are physiological in the monkey, and that in most of the cases they represent nothing more than a simple folliculosis, although future research may demonstrate that this condition is caused by an organism similar to that producing trachoma in the human.

Regarding the conditions produced by inoculation experiments, Wilson found that trauma in the control animal produced a folliculosis which spread to the other eye. Inoculation with the emulsion also caused a conjunctivitis which bore an astonishing resemblance to the early stage of trachoma, but the evolution of the condition was different; there was no pannus nor cicatrization. Although one cannot be certain that this condition is not trachoma, Wilson affirms that these clinical appearances would not be diagnosed as trachoma in man. It is evident therefore that the results of experimental inoculation of animals must be interpreted with a great deal of caution.

George H. Stine.

Zeidler, Maria. **Melanosis conjunctivæ.** Graefe's Arch., 1929, v. 122, p. 628.

In a man over seventy years of age a superficial injury of the conjunctiva with shot produced in the conjunctiva of the left eye a brownish-colored spot which gradually grew larger. Ten years later (in 1924) there was removed from this place a small tumor composed of spindle cells, part of which were strongly pigmented. One year later a small dark tumor removed from the left preauricular region was found composed of the same cells. In 1927 a small

pigmented place present in 1924 at the inferior corneal margin spread in a few months as a flat pigmented thickening around the entire cornea, and the vision, which a few months before had been normal, decreased to 1/3. After exenteration of the orbit a microscopic examination of the excised tissue revealed no trace of malignancy. Many sections showed simple pigment accumulation in the conjunctival epithelium, particularly in the basal layers; in some sections the pigmentation was also found in the corneal epithelium.

H. D. Lamb.

6. CORNEA AND SCLERA

Axenfeld, T. **On the etiology of fascicular keratitis.** Russkii Opht. Jour., 1929, Oct.-Nov., pp. 417-422.

Axenfeld calls attention to his previously reported findings of the pneumococcus in fascicular keratitis. When a scrofulous epithelial defect at the corneal limbus is infected by the pneumococcus, the ulceration assumes a progressive character resembling that of serpiginous ulcer. The comparatively mild course of fascicular keratitis (absence of corneal perforation and of iris involvement) is due to the marginal origin of the ulceration and to its early and adequate vascularization.

M. Beigelman.

Bernd, Willi. **Treatment of herpes of the cornea.** Klin. M. f. Augenh., 1929, v. 83, Dec., pp. 818-819.

In a very obstinate case of herpes of the cornea in a man aged thirty-four years, tincture of iodin and curetting failed. Roasting, i.e. application of the thermocautery at a distance of two millimeters from the affected area for one or two seconds, helped only temporarily, but roentgen rays in eight percent erythema doses administered four times effected a cure. *C. Zimmermann.*

Blank, Adolf. **Observations on the bacterial content of normal corneæ.** Graefe's Arch., 1929, v. 122, p. 661.

It was found that the bacterial content of the cornea corresponded in many cases with that of the conjunctiva. With few exceptions the germs from the outer surface of the cornea grew more meagerly in the culture medium than those from the conjunctiva. The pneumococci occurred only rarely alone upon the cornea, when they could not be demonstrated upon the conjunctiva.

The findings in each eye were frequently different, but in general it must be assumed that beside staphylococci and xerosis bacilli chain-forming cocci also live as saprophytes upon the conjunctiva and frequently (perhaps in all cases) live upon the cornea of normal eyes, although demonstration of the especially labile pneumococci is not apparently possible in many cases.

H. D. Lamb.

Brückner, Z. **The influence of repeated peripheral punctures of the anterior chamber upon the course of ulcus serpens.** Russkii Opht. Jour., 1929, Oct.-Nov., pp. 437-444.

Punctures of the anterior chamber have a beneficial effect upon the course of serpiginous ulcers because of the resulting hypotony. Lowering of intraocular pressure is followed by active lymph transudation into the corneal parenchyma, hence its improved nutrition and increased resistance. The results obtained in the treatment of thirty-two cases of ulcus serpens by repeated paracentesis of the cornea, as compared with a series of two hundred and eighty-five cases treated by antiseptics and by cauterization, were as follows: (1) In mild superficial ulcerations repeated punctures produced the same effect as antiseptics. (2) In deep infiltrations, occupying less than one-third of the cornea, repeated punctures of the anterior chamber proved to be more efficient than antiseptics and equal to thermocauterization. (3) In deep and large corneal infiltrations the hypotony caused by repeated punctures had a beneficial influence upon the course of the disease, without, however, preventing a corneal perforation.

M. Beigelman.

Chams, Gholi. **Keratitis in leishmaniasis.** Arch. d'Opht., 1930, v. 47, Jan., p. 38.

The skin lesion of leishmaniasis or oriental button is quite common in the Orient. Eighteen cases of keratitis were observed during an epidemic in 1922, and two-thirds of those affected also had skin lesions on the lids or near the eye. The keratitis begins with photophobia, erosion of the epithelium, and later a profound infiltration of the cornea results in an intracorneal abscess which may perforate internally or externally. The causative agent could not be isolated from the pus in the cornea. The condition begins to clear in three or four weeks, but usually leaves scars which cause very poor vision. If treatment is instituted in the beginning, the condition begins to clear on about the tenth or twentieth day, and the visual result is much better after healing. The treatment consists of atropin, methylene blue locally, and neosalvarsan by injection. The method of inoculation is thought to be by the hands or by soiled linen. *M. F. Weymann.*

Duke-Elder, W. S. **Keratitis sicca.** Brit. Jour. Ophth., 1930, v. 14, Feb., p. 61.

A case of dystrophy of the cornea was associated with deficiency of lacrimal secretion. A boy, aged five and a half years, complained of chronic photophobia, absence of tears, and the presence of a viscous secretion on the lids. When the child cried he never wept. Examination showed vision of 6/9. The cornea had normal sensation. Situated in the deeper layers of the epithelium, and in a few instances involving the superficial part of the substantia propria, there were considerable numbers of punctate opacities of each cornea. Schirmer's blotting paper test gave subnormal results in the secretion of tears. The author quotes his observations on the literature of the subject. One group of cases evidently result from injury such as skull fracture or section of a nerve, as for example the first division of the trigeminal. The second group seem to be of endocrine origin.

Rather than give the condition a name descriptive of one of its clinical characteristics, it seems preferable to regard it as being associated with deficiency of lacrimal secretion as a clinical entity—keratitis sicca. (One illustration.) *D. F. Harbridge.*

Filatow, W. P. **On preserving the viability of corneal transplants.** Zeit. f. Augenh., 1929, v. 69, Nov., p. 279.

On the basis of Carrel's technique of tissue culture the author bathed an eye for hours at a time in a dilute solution of ground chicken embryo with a slight amount of yolk, in the hope that it would clear a corneal transplant which was becoming cloudy. The corneal stroma did not become decidedly more translucent, but the epithelium, which had been distinctly stippled, became normal in appearance. The author reports this single experience in the hope that those that have more opportunity to work with corneal transplants than he may also try it.

F. H. Haessler.

Fischer, F. **Interchange of gases between cornea and air.** Arch. f. Augenh., 1929, v. 102, Dec., p. 146.

Fischer describes his apparatus, with which the interchange of gases between the living cornea and the surrounding air was measured. It is shown that the oxygen of the air passes through the epithelium of the cornea. This oxygen is probably used by the endothelium. Carbonic acid passes in the opposite direction, probably from the aqueous, through the cornea into the surrounding atmosphere. The corneal epithelium is an impediment to the free passage of oxygen from the air and of carbonic acid from the aqueous. It is however, though to a small extent, permeable to oxygen and carbonic acid. The epithelium itself uses no oxygen from the air and gives off no carbonic acid. While the endothelium can dispense with oxygen derived directly from the air, interference with its giving off of carbonic

acid through the cornea produces swelling or necrosis of the endothelium with cloudiness of the cornea. Oxygen and carbonic acid have the ability to pass through the cornea only in one direction, the oxygen toward the chamber and the carbonic acid toward the air.

Frederick C. Cordes.

Helms, Tage. **Two cases of blue sclera with tendency to fracture of bones.** Med. Selskab for Fyens Stifts Forhandlinger, 1928, pp. 1-6, in Hospitalstidende, 1929, Oct. 31.

The cases presented were in a boy of five years and his father forty-four years old. The boy showed a deep-blue sclera in each eye, with a lighter ring around the cornea, and with a peculiar luster of the iris. No other abnormal findings as to the eyes were present. He gave a history of three fractures at different times, each one the result of trivial injury.

The father had a similar color of the scleras, and at the limbus of each eye he had a white ring resembling in every way an arcus senilis. He had had four fractures from insignificant injuries, all before his sixteenth year. The author presented these cases under the diagnosis of Eddowe's disease (Herbert French classifies similar cases under the name of fragilitas ossium). There was no disturbance of hearing, which is otherwise common, and the mentality was normal in both. There was nothing in the individual histories or in the family history that suggested a possible causative factor. *D. L. Tilderquist.*

Krautbauer, G. **Supplementary remarks on tattooing with platinum chloride.** Klin. M. f. Augenh., 1930, v. 84, Jan., pp. 86-87.

In answering repeated inquiries with regard to his method, Krautbauer says that failures are excluded if the drugs are procured in original packages and correctly applied. Dry platinum chloride is obtainable in sealed glass tubes from Merck, Darmstadt, and hydrazine hydrate from F. Raschig, Ludwigshafen-am-Rh. *C. Zimmermann.*

Liu Pau Hua. **Silvering of the cornea and glaucoma in occupational argyrosis.** Arch. f. Augenh., 1929, v. 102, Dec., p. 334. (See Section 8, Glaucoma and ocular tension.)

Lurie, S. J. **Keratitis marginalis profunda.** Arch. Opht. (Russian), 1930, v. 6, pt. 4, pp. 493-496.

Keratitis marginalis profunda was first described by Fuchs in 1893. It is characterized by a narrow, deep corneal infiltration concentric with the limbus, and it has no tendency toward ulceration. To the six cases of this lesion previously reported in the literature, the author adds a similar observation of his own. *M. Beigelman.*

Matsui, Jin. **Tissue culture of the parenchymal tissue of the rabbit cornea.** Graefe's Arch., 1929, v. 123, p. 77.

The corneal parenchyma was cultivated alone in vitro. The fixed corneal cells of the mature rabbit showed in vitro distinct signs of regeneration; many mitotic figures of nuclear division were seen. In vitro the proliferating corneal cells produced spear-figures analogous to the regeneration spears of Senftleben; inflammatory spears were never found. *H. D. Lamb.*

Mazal, Vladimir. **Keratitis disciformis.** Bratislavske Lekarske Listy, 1930, v. 10, Feb., pp. 74-80.

At the Brno Ophthalmic Clinic during the period between 1921-1926, six cases of keratitis disciformis were treated. Of these five were the result of injury. The trauma as such could not be regarded as the cause, but merely as the exciting factor. In the etiology probably a number of exogenous factors played a part, the individual disposition preparing the way.

Mrazova, Irena. **The effect of malaria on the clinical course of interstitial keratitis.** Bratislavske Lek. Listy, 1929, Dec., p. 1259.

The author reviews the literature and reports briefly the results of twelve cases which she treated with malaria.

The treatment consisted of eight or ten chills, in some patients daily, in others every two or three days; further attacks were checked by quinine. The malaria treatment was given between or preceding courses of antiluetic therapy, and in combination with local treatment. During this course of treatment vision improved and the inflammatory symptoms subsided, only however to return with greater intensity, in all but two cases, after the malarial attacks ceased. From her observations she concludes that this treatment does not materially alter the course of the disease, does not prevent recurrences, has no prophylactic effect on the uninvolved eye, and has no influence on the Wassermann reaction.

Ray K. Daily.

Ohm, J. **Bilateral ring abscess of the cornea due to diplobacillus liquefaciens** (Petit). Arch. f. Augenh., 1929, v. 102, Dec., p. 369.

Ohm gives the detailed course of a bilateral ring abscess of the cornea due to diplobacillus liquefaciens, in a man of forty-seven years.

Frederick C. Cordes.

Sacha, A. **A tubercle on the posterior corneal surface.** Bratislavske Lek. Listy, 1929, Dec., p. 1246.

The author describes a sharply defined grayish-white vertically oval formation on the posterior corneal surface, projecting into the anterior chamber; it developed in the course of a severe iridocyclitis, of probable tuberculous etiology, and, after the disease had run its course, left some pigment and organized exudate. Carrère produced the same process experimentally in guinea-pigs, by the injection of tuberculous material into the anterior chamber; he demonstrated tubercle bacilli in the diseased area histologically, and suggested that polynuclear leucocytes or phagocytes transmitted the organism from the iris to Descemet's membrane. The author believes that this process has taken place in his case.

Ray K. Daily.

Scotti, P. **Clinical observations on the behavior of corneal opacities in keratitis sclerotica.** Ann. di Ottal., 1929, v. 57, Aug.-Sept., p. 661.

This condition is defined as a disease of the cornea, chronic in character, which in a large proportion of cases is the result of an inflammatory focus either in the scleral or the episcleral tissue and which is apt to be recurrent. It is, however, variable in its manifestations. The etiology of sclerosing keratitis is analogous in general to that of scleritis (arthritic, syphilitic, tuberculous), but in those cases involving the sclera (the greater number) there is present an arthritic or uremic diathesis, while in the tuberculous the sclera is not affected and the opacity appears in isolated patches in the corneal parenchyma. The different forms in which the opacity appears give an indication of the degree of probable absorption and are valuable elements in prognosis. (Bibliography).

Park Lewis.

Tagawa, S. **Condition of the corneal surface after cutting of the trigeminus.** Arch. f. Augenh., 1929, v. 102, Dec., p. 231.

Tagawa found that cutting of the trigeminus nerve caused an almost immediate desquamation and swelling of the most superficial epithelial layers, which was the result of the primary irritation. After the passing of this primary stimulation, there is a formation of small dimples that in the reflex picture and in the histological picture resemble the dimple found with drying of the cornea upon evaporation of the lacrimal fluid. This is most easily explained by Tschermak's theory that the trigeminus regulates the physicochemical processes in the protoplasm of the corneal cells. Cutting the facial nerve also produces desquamation and swelling. These changes are not the direct effect of cutting the facial nerve, but are the result of the stimulation of the trigeminus which follows this procedure.

Division of the sympathetic has no apparent effect on the corneal surface.

Frederick C. Cordes.

Terrien, F., and Favory. **Circumscribed abscess of the sclera.** Arch. d'Opht., 1929, v. 46, Nov., p. 641.

Two types of periscleral abscess may be distinguished, that involving the anterior segment, which has a good prognosis, and that in the posterior segment, which may be considered more serious. One case of circumscribed periscleral staphylococcus abscess involving the posterior segment, and which ruptured to drain spontaneously, with complete restoration of normal function to the eye, is described. It is noted that such complete recovery is rare in posterior abscesses, as cases have been reported where blindness and atrophy of the globe resulted from such a lesion. Two cases of anterior scleral abscess are reported, in one of which the pus was sterile and in the other the staphylococcus aureus was found. In this last case there was also a furunculosis. In both cases recovery was complete after evacuation of the abscess.

M. F. Weymann.

7. UVEAL TRACT, SYMPATHETIC DISEASE, AND AQUEOUS HUMOR

Filippow, N. A. **The question of spontaneous serous cysts of the iris.** Klin. M. f. Augenh., 1930, v. 84, Feb., pp. 247-260. (11 ill.)

Two cases of congenital spontaneous serous cyst of the iris in a woman aged twenty-six years and a man aged eighteen years are reported. The cysts were extirpated and examined histologically. From his observation and a survey of the literature the author concludes that spontaneous serous cysts of the iris are rare. The literature contains only eleven cases with histological examinations. They are of great practical importance, as they may produce secondary glaucomatous changes and may also be confounded with malignant formations. Pathogenesis and etiology are not sufficiently elucidated, so that careful microscopic examinations of further cases are desirable. The therapy consists of radical extirpation of the cyst with adherent parts of the iris.

C. Zimmermann.

Fuchs, A. **Albuminuric choroiditis.** Klin. M. f. Augenh., 1930, v. 84, Jan., pp. 39-52. (8 ill., 2 col. pl.)

Albuminuric choroiditis in general is rare. The changes in the choroid occur late, and are not noticed unless repeated periodical examinations are made. Often they only appear after the edema of the retina due to the long existence of albuminuric retinitis has subsided and the atrophic retina has again become transparent, that is at a time when the patient is near the end of his life; which explains their bad prognosis. Three cases are reported in detail, with histological findings in two of them.

With regard to the etiology, Fuchs adopts the view of Hansen, according to which albuminuric retinitis is not caused by vascular changes or ischemia due to vascular spasm alone, but by the same pathogenic agent (toxins?) which produces hypertension.

C. Zimmermann.

Fuchs, Ernst. **Exudative covering in chronic iritis.** Graefe's Arch., 1929, v. 123, p. 42.

The author discusses the covering of exudate on the anterior surface of the iris in chronic iritis. This covering may be composed of loosely arranged lymphocytes and plasma cells; Fuchs has found this kind of covering only in traumatic cases. The exudative covering on the iris may consist of lymphocytes and plasma cells fused together so that their cytoplasm forms a homogeneous matrix without recognizable limiting cell-membranes; the nuclei lie in this ground substance. Accompanying both kinds of iris covering there are frequently corneal deposits composed of lymphocytes. By exclusion the author concludes that the lymphocytes in the iris coverings are derived from the infiltration in the iris. Organization can occur later in these surface exudates by

transformation of lymphocytes into fibroblasts.

In addition, in both endogenous and exogenous chronic iritis, there may occur an exudative covering of two layers on the inner surface of the cornea, iris, ciliary body, or papilla. One of these two layers is the above described layer rich in nuclei and the other layer just beneath the first is of brighter color, containing few nuclei and appearing either homogeneous or finely granular.

The last type of covering on the anterior surface of the iris discussed by Fuchs is that composed of endothelial cells proliferated from the endothelium normally present on the anterior surface of the iris. In these cases of iritis with an endothelial covering there is present as a rule no pronounced lymphocytic infiltration of the iris stroma. Precipitates on the cornea were absent in those of the author's cases which had an endothelial layer on the iris. The majority of these cases followed traumata. Later the endothelial layer changes to connective tissue. Mixed forms of these iris coverings are more frequent than the simple types above described. *H. D. Lamb.*

Guillery, H. **The value and further use of the "Schilfsäckenmethode" (reed sac method) for the pathology of the eye.** Arch. f. Augenh., 1929, v. 102, Dec., p. 352.

Guillery's "Schilfsäckenmethode" consists of the use of a small piece of the tubular membrane lining the central canal of the bulrush in place of collodion sacs. Sacs made with this membrane are more permeable than those made of collodion. The author is convinced that if these sacs are filled with tubercle bacilli and planted into animals, the bacilli do not escape, while the toxins do. In this manner one is able to observe lesions that can be stated as being the result of toxins of tuberculosis and not of the bacilli. Following the intraocular planting of one of these tubercle-bacilli-filled sacs, a perivasculitis develops, with in some areas injection of a group of vessels. Surrounding these vessels is a proliferation of cells that microscopically give the picture of a phlyctenule. In addition, it is possible to produce a uveitis that begins as perivasculitis just as in sympathetic ophthalmia, and resembling the toxic uveitis produced by intravenous injection of certain toxins. Where the sac is planted in one eye, the remaining eye may develop similar typical lesions.

The article does not lend itself well to abstracting, but should be read in full. *Frederick C. Cordes.*

Issatchenko, N. N., and Filatow, W. P. **Intraocular ossifications clinically diagnosed by roentgen rays.** Klin. M. f. Augenh., 1930, v. 84, Feb., pp. 240-246. (7 ill.)

Three cases are reported in which ossification of the choroid was diagnosed by roentgen ray examination, and anatomically confirmed.

C. Zimmermann.

Reis, Wiktor. **Gas bubbles in the anterior chamber—a new differential diagnostic symptom of metastatic bacterium coli endophthalmitis in diabetes.** Klin. M. f. Augenh., 1929, v. 83, Dec., pp. 784-787.

A diabetic woman aged fifty years, affected with purulent colon bacillus pyelitis, showed iridocyclitis with occlusion of the pupil of the left eye. Examination of the blood revealed, apart from sugar, the cytological picture of sepsis. After two days hypopyon was observed and there was suspicion of metastatic panophthalmitis. Between iris and cornea a few gas bubbles were visible, which were considered as confirmation of the diagnosis of metastatic infection by bacterium coli, although a bacteriological examination of the intraocular fluids had not been made. The patient died after two days from her pyelitis. *C. Zimmermann.*

Safar, Karl. **The origin of the orange-yellow coloring in the anterior part of the eye (Szily's xanthomatosis bulbi) in association with hemorrhages into**

the anterior chamber. Graefe's Arch., 1929, v. 123, p. 19.

From his own observations and those reported in the literature, the author comes to the conclusion that one of the possible methods of production of xanthomatosis bulbi in connection with intraocular hemorrhages occurs when the eyes are severely injured and their power of resorption considerably disturbed with the consequent formation of a yellow coloration in the region of the anterior chamber. Such a yellow coloration can also be produced experimentally in rabbits' eyes. The blood in the anterior chamber first changes into a brownish mass which gradually takes on an intensively yellow tinge. As cause of this yellow color in animal experiments there is present a pronounced fatty degeneration in the anterior chamber, in which the hemorrhage is seen surrounding granulation tissue, whose cells have plentifully taken up fat-like material. These latter cells arise in the destruction of intraocular hemorrhage and can also contain iron-bearing material derived only from the blood. *H. D. Lamb.*

Schultz, W. **The arbitrary production of pigmentation of albinotic eyes and sympathetic heterochromia of the iris.** Graefe's Arch., 1929, v. 122, p. 601.

With the help of a special Mendelian tendency of Russian and Himalayan rabbits, there was arbitrarily produced by the author for the first time a melanin pigmentation of the inner coats of albino eyes, on the principle that during growth relatively lower temperature leads to the formation of melanin. The arbitrary production of pigmentation in albino eyes was obtained in the natural layer in living new-born, in transplants in the ear, and in explants kept in moist oxygenated tubes at about 33°C. in the case of new-born and fetal rabbits. A heterochromia of the iris from cold was once observed by the author in a new-born Russian rabbit. A sympathetic system heterochromia has been produced by Iljin on the basis of the author's experiments, also a difference between the coloring of the ears with brighter coloring on the side of the sympathetic paralysis. The brighter coloring on the side of the sympathetic paralysis is apparently produced by the dilatation and greater content of blood in the vessels on that side. The consequent greater warmth on this side destroys the oxidative melanin-producing ferment and thereby deprives the cell of the possibility of forming melanin in spite of the richer supply of oxygen, or it shortens the available time for the process of melanin formation. It should be determined whether a similar mechanism also causes brighter coloring on the paralyzed side in sympathetic heterochromia of man. It should especially be considered that the pigment-forming factor under consideration in man belongs to the same series of multiple allelomorphs as that of the Russian rabbit and differs from it only quantitatively. In addition another factor of this series—the "chinchilla" factor (because observed in the chinchilla rabbit) possibly brings about through the inner body temperatures a heterochromia of the eye with blue-coloring on the sympathetic paralyzed side and a dark coloring on the nonparalyzed side. The fundamental explanation for quantitative differences in appearance of a series of multiple allelomorphs is here for the first time presented. *H. D. Lamb.*

Urbanek, J. **Recurrent hypopyon iritis and tuberculosis.** Zeit. f. Augenh., 1929, v. 69, Sept., p. 174.

Typical recurrent hypopyon iritis associated with inflammation and atrophy of the optic nerve has been called iritis septica by Gilbert. He has associated it with erythema nodosum. Urbanek does not share this view. For the first time he records observations which point to tuberculosis as the etiological factor. In one of his patients each recurrence of hypopyon was preceded by the appearance of disseminated ulcers in the buccal mucosa and increased swelling and secretion of the mucosa of the nose, where a typical tuberculous

granulation tissue was found at biopsy. No evidence of etiology other than tuberculosis could be found. In the other patient a severe recurrent hypopyon iritis associated with severe changes in the retina and optic nerve was accompanied by tubercle bacilli in the sputum. On two occasions artificial pneumothorax was induced in a period when the eye was quiet, and each time after introduction of the gas hypopyon appeared, though the eye remained pale. In each patient a course of tuberculin therapy was augmented by triphal, a preparation of gold.

F. H. Haessler.

8. GLAUCOMA AND OCULAR TENSION

Alexander, W. **Permanent relief of pain in absolute glaucoma and ciliary neuralgia, by anesthesia of the gasserian ganglion.** Klin. M. f. Augenh., 1930, v. 84, Jan., pp. 65-68.

Injection of alcohol into the gasserian ganglion at once relieved vomiting and uncontrollable pain in an eye blind from absolute glaucoma. After two years there was no recurrence of pain, although the tension had not been influenced. The second case was one of most severe ciliary neuralgia, in which injection of alcohol into the gasserian ganglion relieved the pain permanently without any disturbance of vision or appearance.

C. Zimmermann.

Amsler, Marc. **Perforating thermocauterization.** Ann. d'Ocul., 1929, v. 166, Nov., pp. 871-888.

The author performed a cautery puncture by the method of Gonin in an eye which was to be enucleated for glaucoma. The tension, which had averaged about 40 mm., went up to 60 mm. the following day, and then went down to 15 mm., where it remained until enucleation was done two weeks later. It was noteworthy also that the pain was relieved. At section there was an artificial detachment except at the point of cauterization. *Lawrence T. Post.*

Birch-Hirschfeld. **The tonometric appraisal of glaucoma.** Zeit. f. Augenh., 1929, v. 70, Dec., p. 1.

The author states briefly the conclusion at which he arrived after extensive tonometric studies, the details of which he will present in another essay. He advocates tonometric measurement three times daily. A single afternoon measurement may lead us astray entirely and give a false sense of security. He believes that probably in all cases of so-called glaucoma simplex a rise of tension is discoverable by frequent measurement. Incipient progressive primary glaucoma is characterized by great daily variations in tension. The tension chart resembles the temperature chart in pneumonia. It is necessary to continue measurement of tension after an operation designed to reduce the tension, because not infrequently a rise is discovered after an initial reduction to normal. On the other hand the daily variations may persist for some time after operation and only gradually fall to a continuous norm.

In primary glaucoma the curves of the two eyes may be nearly parallel if not identical. This is not true of secondary glaucoma. In a number of cases one eye was nearly blind from advanced glaucoma, while the other eye had a marked glaucoma curve with great daily variations and other signs of glaucoma. A successful operation on the almost blind eye was also followed by protracted reduction in tension of the better eye. Elliot's operation was so much more effective than cyclodialysis that the author does the latter only when the former is definitely contraindicated. *F. H. Haessler.*

Duverger, C., and Velter, E. **The surgical treatment of glaucoma.** Arch. d'Opht., 1930, v. 47, Jan., p. 47.

With the passage of time the proportion of cases classed as true primary chronic glaucoma becomes lessened, because in many such cases the condition has recently been found to be secondary hypertension. However, in those cases where no etiological fac-

tor is known, the surgical treatment of choice is a filtration operation, preferably that of Lagrange. The exact technique consists in making a five to six mm. incision behind the limbus with a Graefe knife. The scleral and conjunctival flaps are made as the incision is completed. The conjunctival flap is separated from the sclera beyond the limbus with the Graefe knife, and the scleral flap is then cut off at the limbus with the same instrument. Peripheral iridectomy is done and the operation is completed. The small incision is especially emphasized. The Lagrange has over the Elliot operation the advantages of having a larger extent of scleral opening in the angle, less danger of damage to the ciliary body, and a less traumatized conjunctival flap.

Over one hundred and fifty operations were done by the writers in fifteen years, of which ninety-three percent showed permanent fistulization.

M. F. Weymann.

Hudelo, A. **Glaucoma and facial nevus.** Ann. d'Ocul., 1929, v. 166, Nov., pp. 889-902.

A case is reported and the subject discussed. Because of the frequent association with cerebral nevi and the good effect of radiation upon such lesions, this therapy is advocated in glaucoma in the presence of facial nevi.

Lawrence T. Post.

Kahler, H., and Sallmann, L. **The relation of the ocular tension to general blood-pressure.** Graefe's Arch., 1929, v. 122, p. 634.

In sudden changes of general blood-pressure produced by thermic irritation of the skin, by lumbar puncture, after the administration of drugs acting on the blood vessels, and in Cheyne-Stokes breathing, the suddenly occurring variations in the ocular tension were always in inverse ratio to those of the general blood-pressure. The experiments apparently indicate therefore that, during rapid changes in blood pressure, changes in ocular tension take place only as the result of changes in the caliber of the ocular blood vessels, for the contrary relation of the two amounts can hardly be explained otherwise. Consequently the generally accepted opinion that sudden increases in blood pressure produce glaucoma should probably be abandoned. The view of an opposing relation between the ocular and skin blood vessels as regards regulation of the vessel caliber finds no support in these observations; and these findings also throw doubt on the correctness of the Dastre-Morat law of equilibrium (antagonism between the splanchnic and skin vessels).

H. D. Lamb.

Liu Pau Hua. **Silvering of the cornea and glaucoma in occupational argyrosis.** Arch. f. Augenh., 1929, v. 102, Dec., p. 334.

The patient, a man of sixty-three years, had been employed for thirty-five years in silvering mirrors. The cornea in each eye showed the presence of silver, together with other changes in the eye, but without generalized argyrosis. There was a bilateral glaucoma, with complete amaurosis in the left eye. Liu Pau Hua considered the glaucoma secondary to the local argyrosis.

Frederick C. Cordes.

Maggiore, Luigi. **Experimental contributions on the mechanism of anterior sclerotomy.** Ann. di Ottal., 1929, v. 57, Aug.-Sept., p. 579.

The numerous attempts to modify the Lagrange operation proposed in 1905 have been offered in some instances to render a difficult procedure more easy, in others to overcome the frequent disadvantage of firm closure of the cicatrix leaving the endocular tension as high as before. In many cases the bulla is present for months. In others it becomes distended by the aqueous and ultimately ruptures.

A genuine and permanent fistula is secured in only a limited number of cases. To determine the reason of this, experimental studies were undertaken by the author. He employed various methods in making the sclerocorneal opening on groups of rabbits. Meller

had demonstrated in a series of enucleated eyes that only when uveal tissue remained between the lips of the section was a permanent filtrating cicatrix obtained. In all other cases the wound was closed by proliferation of the scleral fibers.

Maggiore's researches on human eyes, removed for other causes, in which an opening had been made at the sclerocorneal juncture, as well as his experiments on the eyes of rabbits, confirmed this fact. In his experiments, conjunctival tissue and even a foreign substance such as mica have been introduced, but the opening ultimately became firmly occluded. The effect with muscle tissue was somewhat more successful. In one instance a fine canula was left in the anterior chamber, but it filled with fibrinous exudate. Only when uveal tissue remained in the wound was the proliferation of the scleral tissues definitely interrupted. The presence of pigment seemed necessary, as the iris from albino rabbits did not so completely preclude ultimate closure of the opening.

(See also editorial in the American Journal of Ophthalmology, April, 1930, page 340.)

Park Lewis.

Sondermann, R. **Contribution to origin, physiology, and pathology of intraocular pressure. Part 1. The origin of intraocular pressure.** Arch. f. Augenh., 1929, v. 102, Dec., p. 111.

Sondermann reviews the work that has been done on the origin of intraocular pressure. In his experimental work on rabbits, he found that the pressure in the uveal veins and capillaries was about 25 to 30 mm. Hg higher than that in the corresponding vessels of the retina.

It has been acknowledged for some time that the uveal vascular system, in addition to its nutrient function, also has an optico-static function, while the retinal vessels give nourishment only. This shows the necessity of separating the two systems; for with such different functions a common solution of their actions is impossible.

The problem of pathological intraocular pressure will not be solved until the physiological pressure is understood. The latter question has been unanswered, because in all the work the pressure of retinal veins has been taken as that of the uveal blood vessels. Sondermann feels that he has shown this to be an error. He concludes that the intraocular pressure is the difference between the capillary pressure of the uvea and the osmotic pressure. (This will be continued in the next issue of the Archiv.) *Frederick C. Cordes*

9. CRYSTALLINE LENS

Adams, D. R. **The nature of ocular lesions produced experimentally by naphthalene.** Brit. Jour. Ophth., 1930, v. 14, Feb., p. 49.

This contribution concerns itself with the nature and variety of retinal exudates, the deposition of crystals in the vitreous and retina, changes in the ciliary body and lens, and the general metabolic changes produced by administration of naphthalene. A review of the literature on the work of many investigators is given. The work of the author was standardized by administering 3 gm. of naphthalene in liquid paraffin to an animal of 2 to 3 kg. and was repeated daily until the lesions appeared. With this dose, it was usual for retinal exudates and early peripheral lens striæ to appear within twenty-four hours, and this could be ensured if 3 gm. of glucose was given in addition. (The additive effect of the latter substance is probably due to the fact that it aids absorption. Glucose alone or with paraffin is quite innocuous.) Retinal exudates would generally proceed to a fully confluent stage without a further dose of naphthalene, but in order to encourage the later development of a complete cataract the dose was usually repeated for several days.

In contrast to the statements of Hess, Magnus, and others, it seemed an invariable rule for retinal exudates to appear just before the onset of lens changes, and subsequently the deposition of crystals. On the other hand the lens often remained in the stage of early

striæ, and never became opaque, although the retina had become completely atrophic and detached. In contrast to Panas's suggestion (1887), such a maintenance of transparency would suggest that lens nutrition is independent of that of the retina.

In a few cases a contraction of the pupil, which was unaffected by atropine, occurred within the first few hours. While it may be impossible to attribute these changes to any one causative factor, yet they present certain features which suggest that they may be due to a disturbance in the normal balance of the inorganic constituents in the body, rather than a direct toxic effect of naphthalene. Seven photomicrographs.

D. F. Harbridge.

Elschnig, A. **Intracapsular cataract extraction in keratoconus.** Russkii Opht. Jour., 1929, Oct.-Nov., pp. 454-455.

In a patient afflicted with keratoconus and senile cataracts, the visual acuity was counting fingers at one meter in the right eye, and 1/36 with —4.00 D. sph in the left eye. The right eye was in a divergent position, and had slight opacities at the apex of the keratoconus. Following a bilateral intracapsular cataract extraction (Stanculeanu-Knapp-Török method) a remarkable improvement in the visual acuity was found; in the right eye 6/24 with + 6.00 D. sph. + 5.50 D. cyl. ax. 180°, and in the left eye 6/8 with + 9.00 D. sph. + 3.00 D. cyl. ax. 170°.

M. Beigelman.

Panico, Emanuele. **Cataract from sodium chloride.** Ann. di Ottal., 1929, v. 57, Aug.-Sept., p. 613.

By means of an exceedingly fine canula needle the author punctured the cornea of a group of rabbits. After withdrawing a few drops of aqueous humor he injected an equal amount of a saturated solution of the salt. In other groups he used solutions of three, two, one, seventy-five hundredths, and fifty hundredths percent. These were also injected into the vitreous. The strong solution caused pain, evidently but of short duration, and almost at once clouding was noticed both in the anterior portion of the lens and in the lower third of the cornea. The anterior layers of the lens became covered with vertical streaks crossed by horizontal ones, leaving partially transparent quadrangular zones. At the expiration of seventy hours the lens became normal again, except for stellate opacities in the pupillary area of the anterior cortex.

In addition to this he concludes from his further experiments that the concentrated solution causes changes in the conjunctiva, the cornea, the aqueous, and the iris which disappear after a period of about three days. The weaker solutions in the posterior chamber give rise to opacities of the posterior cortex, limited to the equatorial region. The saturated solution in the vitreous occasions opacities of the cortex of the lens, causing striæ in the anterior portion similar to those produced by the two to three percent solution, when injected into the anterior chamber. Following injection of the strong solution of the salt there remains a small permanent opacity of the posterior cortex. The histopathological examination gave evidence of a diminution in volume of the opaque zone and the presence of small vacuoles in the substance and between the fibers of the lens structure. (Bibliography.)

Park Lewis.

Papolczy, Franz. **Partial epithelial lining of anterior chamber after cataract extraction.** Klin. M. f. Augenh., 1930, v. 84, Feb., pp. 266-270. (1 ill.)

A woman aged sixty-eight years in whom sixteen years previously a cataract of the left eye had been removed, with discission two years later, developed pain and inflammation four years ago, and the blind painful eye was enucleated. The anterior surface of the iris and the pupillary area were covered with a stratified pavement epithelium, which terminated at the opposite angle in the form of a solid mass of epithelium.

C. Zimmermann.

NEWS ITEMS

News items in this issue were received from Drs. C. A. Clapp, Baltimore; G. Oram Ring, Philadelphia; and M. F. Weymann, Los Angeles. News items should reach **Dr. Melville Black**, Metropolitan building, Denver, by the twelfth of the month.

Deaths

Dr. William W. Speakman, Philadelphia, aged sixty-four years, died February twenty-seventh.

Dr. William D. Hall, South Dennis, Massachusetts, aged eighty-five years, died January twenty-seventh.

Dr. William L. Dayton, Lincoln, Nebraska, aged seventy-two years, died February twenty-eighth. Dr. Dayton had occupied a conspicuous position in western ophthalmology.

Professor Amilcare Bietti, director of the University eye clinic in Bologna, Italy, died early in January of angina pectoris, at the age of fifty-nine years. He was the author of a three volume textbook of ophthalmology in Italian, and was also an active editorial collaborator on the Klinische Monatsblätter für Augenheilkunde. An obituary of Bietti by Axenfeld, with portrait, appeared in the February issue of the Klinische Monatsblätter für Augenheilkunde.

Miscellaneous

The American Board of Ophthalmic Examinations certified sixty-three applicants during the year 1929.

Wills Eye Hospital, Philadelphia, was recently bequeathed $5,000 by the will of the late Dr. Philip H. Moore, Philadelphia. Under the will of the late Edward T. Dobbins, Wills Hospital was bequeathed $1,000.

The fifth annual clinic of the University of Colorado School of Medicine and Hospitals was held March 26, 27, and 28. Dr. Edward Jackson delivered a lecture on examination of the eyes of school children, and Dr. D. H. O'Rourke on the diagnosis of blindness. Drs. Melville Black, William C. Finnoff, J. M. Shields, and William M. Bane held operative clinics.

In the portrait group of the Amsterdam luncheon party, included in our January issue, it was unfortunately impossible to include the names of some of those present. If any of our readers is able to identify guests whose names were not given, the editor will be very glad to receive such information.

A new Russian language eye periodical is now being issued with the title of "Ukraine Ophthalmological Journal", under the editorship of Professor Prokopenko, of Kharkov.

The Board of Surgeons of the New York Eye and Ear Infirmary has begun a new publication, entitled "New York Eye and Ear Infirmary Clinical Reports". The first issue, dated March, 1930, contains ten short original articles, in addition to editorial matter. The Infirmary, which was 109 years old on the day when the editor of the new publication wrote his editorial introduction, now counts 152 alumni in active practice. The "Reports" are to be issued three times a year.

An interesting example of the cosmopolitan spirit of our South American colleagues is to be found in the fact that two out of three of the original articles in the January issue of the Revista Oto-Neuro-Oftalmologica (Buenos Aires) are published in French instead of in Spanish. The two papers referred to are by Bailliart and Monbrun, both of Paris.

For his mode of treatment of retinal detachment, Professor J. Gonin of Lausanne was recently awarded the prize of the Marcel Benoist Foundation. The prize is awarded to the Swiss scientist who during the past year has made the most useful discovery, invention, or study in science, particularly as related to human life.

The French Académie des Sciences recently decided to create the "Pierre-Félix Lagrange Foundation, the purpose of which is to reward or encourage every discovery or research in the domain of the sciences concerned with the visual apparatus and vision itself".

A recent issue of the Archives d'Ophtalmologie (Paris) pays particular honor to the memory of Madame Panas, widow of the former professor of the ophthalmologic clinic of the University of Paris. Madame Panas, up to her last days, had been very active in philanthropic work. In spite of her advanced age and delicate health, she went through the whole of the World War as a Red Cross nurse, directing a hospital while under bombardment. Among other distinctions she was made (among other awards) Chevalier de la Légion d'Honneur and received the Croix de guerre. Her husband and she were of Greek origin.

The president, Professor Emile de Grosz, and the secretary, Dr. F. Wibaut, of the International League against Trachoma, which was established during the International Congress at Amsterdam, have been in communication with many of the leading ophthalmological societies of the world as to the appointment of delegates. Up to February twenty-eighth, forty-nine delegates had been appointed by the societies. The next meeting of the League will be held on July 26, 1930, in Geneva, Switzerland.

Societies

The Deutsche Ophthalmologische Gesellschaft will meet in Heidelberg on June 12, 13, and 14, 1930.

The proceedings of the First Pan-Pacific Surgical Congress, held in Hawaii in August, 1929, have just been issued in a very attractive form. Among eye papers presented, the work of Dr. Pinkerton of Honolulu on the surgery of leprous eyes was given high praise by the chairman of the eye section, Dr. Lloyd Mills.

The twentieth annual meeting of the Oxford Ophthalmological Congress will assemble at Keble College, Oxford, in the evening of Wednesday, July ninth, and the meetings will be held on Thursday, Friday, and Saturday of the same week. A very attractive program has been arranged, including Dr. H. M. Traquair, Sir Farquhar Buzzard, Dr. J. A. Gunn, Sir Oliver Lodge, Dr. Harry Friedenwald, Professor Jules Gonin, Dr. Leighton Davies, Dr. Bernard Samuels, Dr. de Courcy, and Dr. J. A. Van Heuven.

It is to be hoped that a number of ophthalmologists from the United States will find it convenient to attend the ninety-eighth annual meeting of the British Medical Association, in Winnipeg, August 26 to 29, 1930. The president of the Association's meeting will be W. Harvey Smith of Winnipeg, himself an ophthalmologist. N. Bishop Harman of London will preside over the ophthalmic section of the meeting.

On the program of the Section on Ophthalmology of the College of Physicians of Philadelphia, April 17, 1930, the following items appeared: by Dr. H. Maxwell Langdon, a case of acute haze in the vitreous following the external use of adrenalin and scopolamin for the separation of synechiæ; by Dr. William Zentmayer, some interesting cases of corneal trephining in chronic simple glaucoma; by Dr. Burton Chance, treatment of foreign body in the lens; by Dr. Frank C. Parker (by invitation), moving pictures of ophthalmic operations; by Dr. W. E. Fry (by invitation), a case of total congenital color blindness; by Dr. I. S. Tassman (by invitation) a case of argyrosis.

Personals

Dr. Arnold Pillat was a recent visitor at the Wilmer Institute.

At the recent centennial meeting of the Tennessee State Medical Association, Dr. William H. Wilmer presented a paper upon the subject of retrobulbar neuritis.

Dr. James M. Shields of Denver has been advanced to the position of assistant professor of ophthalmology in the medical department of the University of Colorado.

Dr. Ralph W. Danielson, who has been associated with the ophthalmological department of the University of Colorado medical school for the past two years, announces the opening of an office at 424 Metropolitan building, Denver.

Because of the large number of Andersons in Minnesota, Dr. Hilding C. Anderson of Duluth has petitioned to have his name changed to Anderson C. Hilding. Dr. Anderson was recently given a banquet by the ophthalmologists of Duluth previous to his leaving to take a position with the Mayos at Rochester.

American Board for Ophthalmic Examinations

The next meeting of the Board will be held at Detroit, Monday, June twenty-third, at the Harper Hospital. Applications should be made to the secretary, Dr. William H. Wilder, 122 South Michigan avenue, Chicago.